THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXI. No. 1565.] LONDON, MAY 9, 1893. [45TH YEAR. PRICE 6d.

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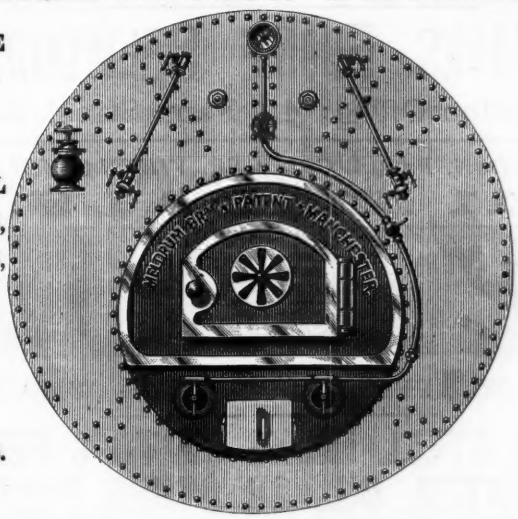

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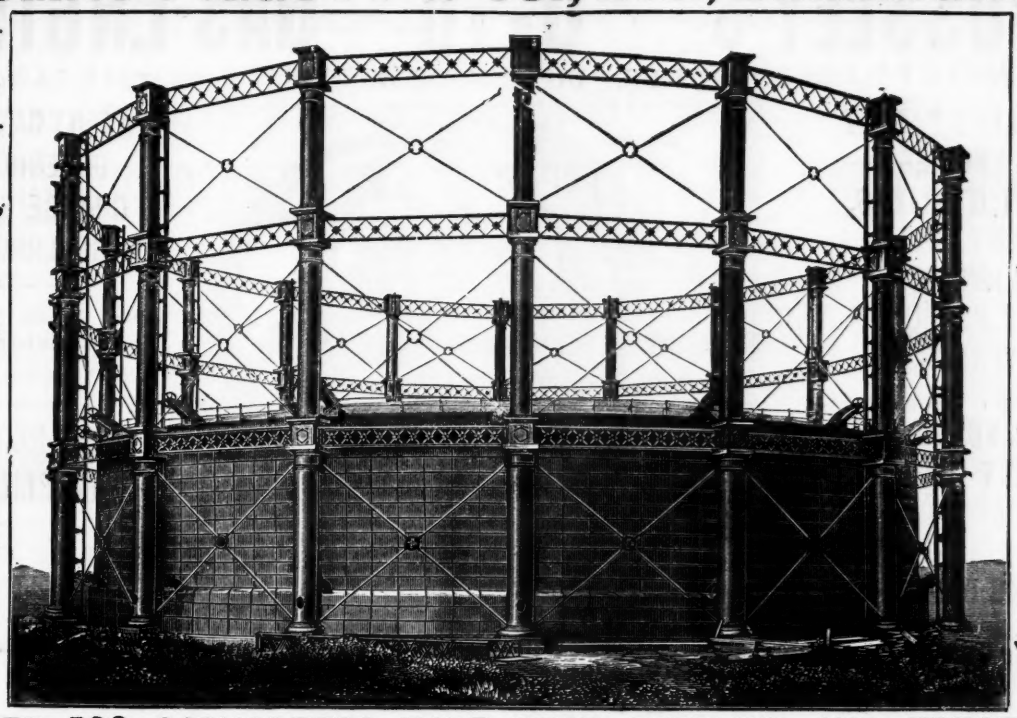

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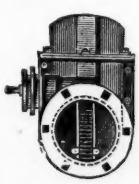

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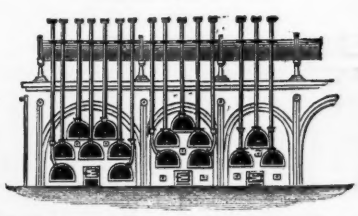

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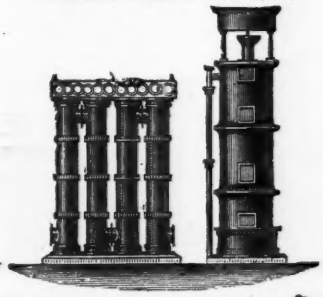

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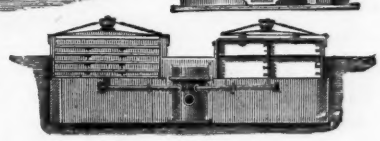

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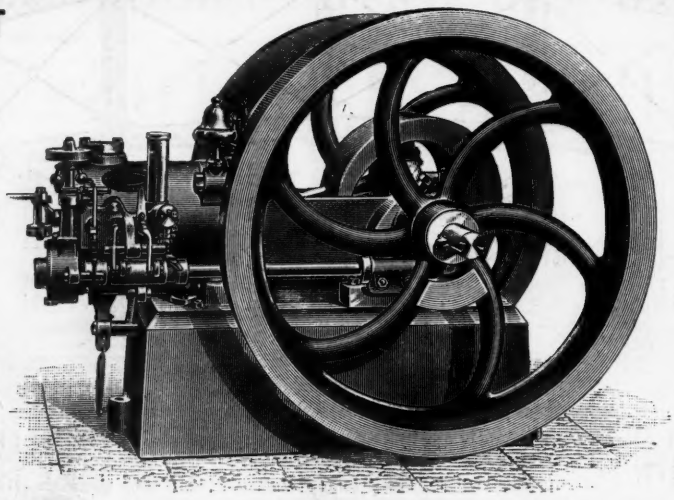

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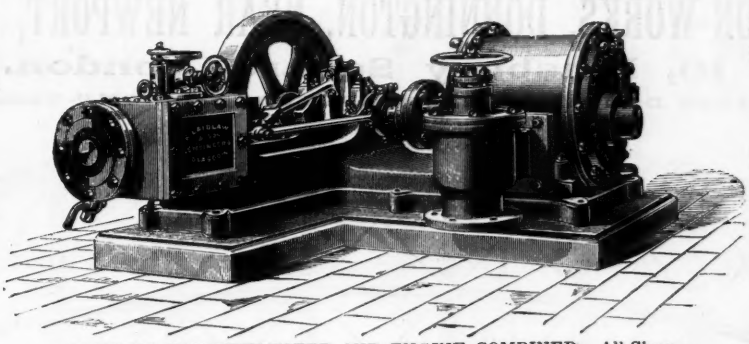

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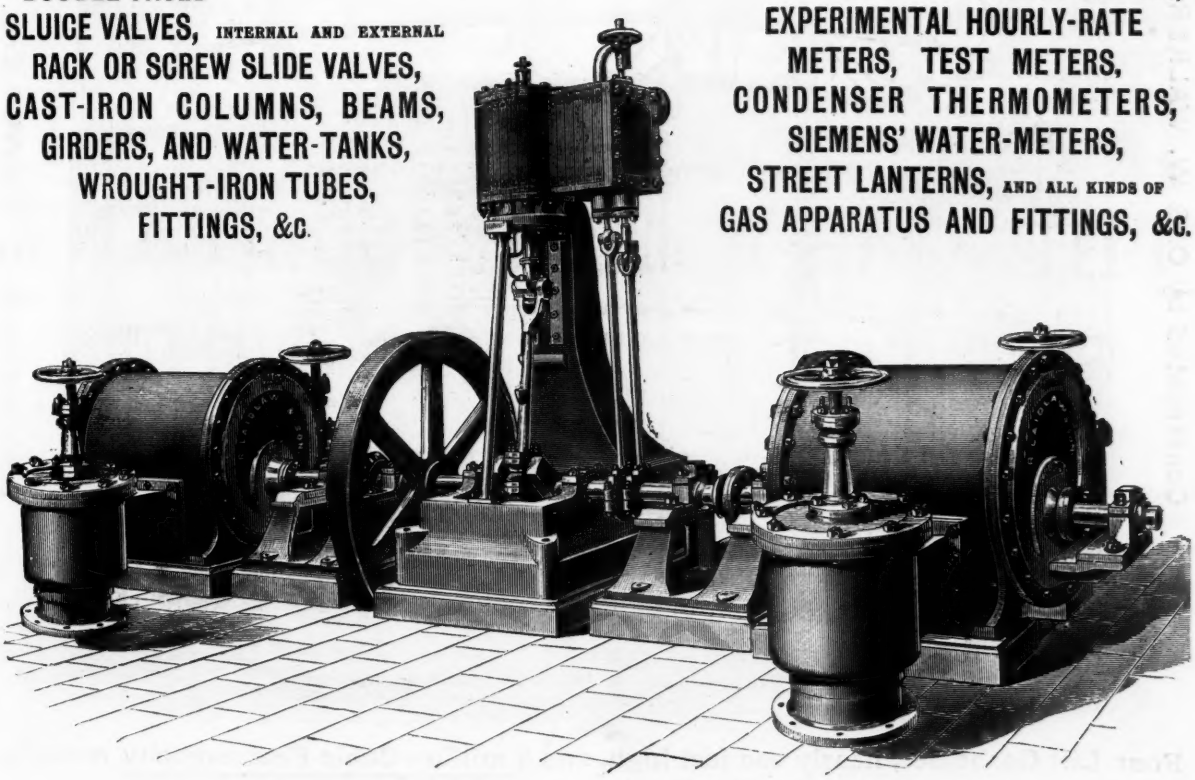

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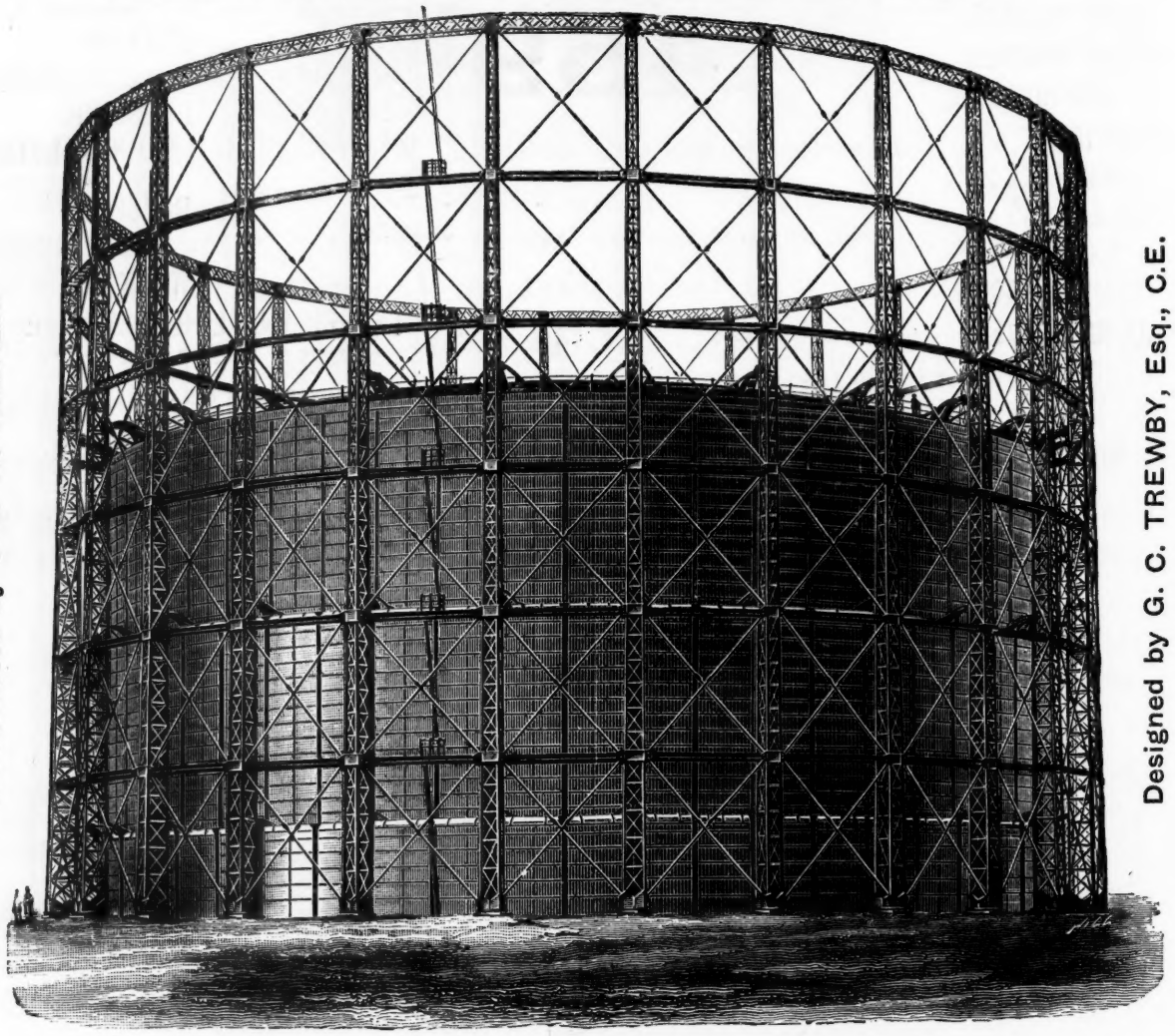

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I am, yours truly,
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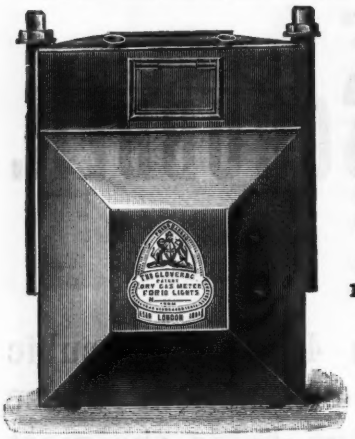

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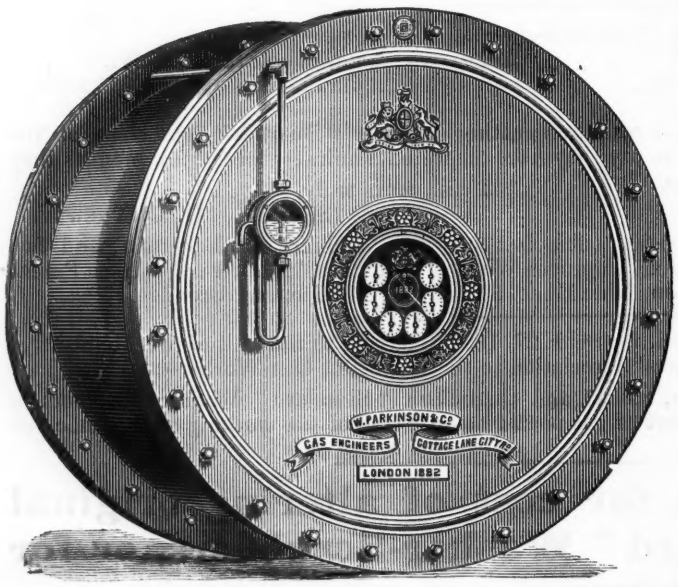

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No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, MAY 9, 1893.

The New Secretary and General Manager of The Gaslight and Coke Company.

As will be seen by the official announcement in another column, the Directors of The Gaslight and Coke Company have promoted Mr. John W. Field, till now Accountant of the Company, to the office of Secretary and General Manager, in succession to Mr. John Orwell Phillips, upon whose retirement on the ground of ill-health we have already commented, and who will forthwith take a seat upon the Board. The new Secretary and General Manager, who is personally to be congratulated upon his good fortune, is a son of Mr. John Field, late Accountant to the old Imperial Gas Company, and originator of the well-known "Analyses of Gas Companies' Accounts," which were started when there were enough Companies in London alone to make a respectable list for purposes of comparison. Mr. J. W. Field has thus been brought up in an atmosphere of account-books; and he has given many proofs of great ability in his profession. It would be mere affectation to ignore the manifestations that have appeared on different occasions recorded in the JOURNAL, which go to show that Mr. J. W. Field's qualifications for the post now conferred upon him are not so generally believed in outside the Horseferry Road Board-room as is his talent for accountancy. Not to put too fine a point upon it, there are many people, not incompetent to judge of such matters, who will regard this able gentleman in his new offices as an example of a "square peg in a round "hole." Time will show whether or not the appointment, the importance of which can hardly be exaggerated in connection with the future of the Company, is a wise one. We have no desire to increase the difficulty of the situation by discussing the question of the popularity of the new Secretary and General Manager inside or outside the Company. Popularity is not everything; and there are even times in the history of most old-established industrial undertakings when a head who is prepared to make himself downright unpopular in certain circles is the very man required for the place. In the case in point, all that need be thought of is the good of the Company. If the new Secretary and General Manager succeeds in curing some of the evils from which the huge Company has suffered too long, it will matter little whom he offends in the process, in the estimation of those who will be benefited thereby. After what we remarked upon the subject last week, we cannot sincerely hail the announcement as that of an ideal appointment; and Mr. Field himself would say we were writing sarcastically if we were now to offer congratulations to the Company upon having a General Manager drawn from the very source on which we wrote deprecatingly in our last week's issue—"the Horseferry "Road *entourage*." However, there he is; and those whose interest in the subject of Chartered management is closer than that of the class sometime referred to by the Governor as "irresponsible critics," must make the best of it while awaiting developments. So far as the JOURNAL is concerned, the consideration whether the chief administrator of Chartered affairs is the late Accountant or anybody else is of infinitely less moment than that the undertaking should be efficiently managed. Whoever shall succeed in making the Company strong, prosperous, and well reputed of in the Metropolis, will have all the praise and support we can give him.

The Crystal Palace District Gas Bill as Amended.

THE Crystal Palace District Gas Company's Bill is the subject of a letter from Messrs. Stevenson and Burstal which appears in our "Correspondence" columns. These gentlemen, whose real reason for writing appears to be a perfectly natural anxiety to defend their own position as advisers of one of the opposing Local Authorities, say that a "few errors" crept into our last week's editorial comments on the Bill; but we cannot accept this for true criticism. We said nothing about the Beckenham Local Board or their desires, and did not consider how much of all the claims raised in opposition to the Bill by Beckenham or Croydon, or any other petitioners, had been given to them. We merely observed that a settlement was arrived at after the promoters' case had been stated; and we took Mr. Bidder's word for it that this result was due to Mr. George Livesey's evidence. We certainly might have distinguished more exactly between the draft of the Bill and Mr. Livesey's declarations; but, "broadly speaking," as we remarked, it was not an error to assume that the Company were ready to abide by Mr. Livesey's demands on their account. We quite agree with our correspondents that the happy termination of the opposition on the preamble was due quite as much to the reasonableness of the opponents as to the fairness of the promoters—indeed, we said as much. The last sentence of the letter refers to a matter that only arose on Monday of last week, when the Bill came up again for the settlement of clauses. Greatly to the surprise of everyone, and purely, as it would appear, out of that innate "cussedness" which has already gained for the London County Council many a fall in Parliament, this body sent Mr. Pope to the Committee to announce their withdrawal from the agreement arrived at on the previous Thursday, in order that they might prefer

a claim to be recognized as the testing authority for the part of the Company's district lying within the area of the County of London. This claim was strongly contested both by the Company and the other Local Authorities interested, who have no desire to be overawed by the London County Council; and the Committee eventually declined to entertain it. After this bit of attempted aggression, to which one is inclined to prefix an adjective, had been repelled, agreed clauses carrying out the arrangement entered into at the previous hearing were brought up and passed; and the Chairman of the Committee reported the Bill, as amended, to the House last Thursday.

The Gas Supply of Paris.

THE report of the Directors of the Paris Gas Company, and the statement of accounts relating to the past year's working of the undertaking, which came before the shareholders at the recent annual meeting, have lately been published; and an abstract translation will be found in another column. There was a small falling off in gas consumption in the French capital during the past year; but the day supply shows a comparative increase, and the number of consumers is also growing—two circumstances upon which the Directors specially pride themselves as having been brought about by their policy of encouraging occupiers of small tenements to use gas. The revenue account shows a gross profit balance of £1,387,149, which is dealt with in the usual manner, and provides a dividend after the rate of 28·8 per cent. on the share capital. The report contains the inevitable explanation, from the point of view of the Directors, of the condition of affairs as between the Company and the Municipality. It is difficult to maintain a duly respectful gravity for the perusal of the directorial argument, *à propos* of the price of gas in Paris, that the popular belief that the Company are making "extraordinary profits" is "a misunderstanding, which it is "necessary to dispel." It is alleged that the French have no sense of humour; and the impeachment derives support from the fact that a body of Directors of a Company paying nearly 29 per cent. on the scarcely hazardous business of supplying Paris with coal gas, seriously term the imputation of wealth a "misunderstanding." They complain of having to divide some of their profits with the Municipality; but it pays them very well to do this, under the existing conditions. It is impossible to deny that the high price of gas in Paris is something of a scandal; and the public, who see no farther than the "brutal fact" of this price, neither ask nor care to know where the money goes. If inquiry is ever made, the next thing to appear in evidence is the dividend. The Directors of the Company have more reason for their declaration, towards the end of their report, that they do not admit themselves to be responsible for the maintenance of the *status quo*. This is really the consequence of a concession settled in *doctrinaire* fashion many years ago, ignoring all the considerations which actually govern the cost of gas making in large towns. Perhaps the Company need not have taken the course they did, of making a huge surplus profit over and above their normal dividend, with a view to sharing it between themselves and the Municipality. It is scarcely honest for the latter body to threaten the Company with one hand for maintaining a high price of gas, while holding out the other for the covenanted share of the plunder. But, again, it is absurd for the Directors of the Company to complain of their partners in this imposition for doing the same thing as they do themselves. The truth is that the situation of the Paris Gas Company is a thoroughly artificial one. Any group of financiers would gladly form a new Company for supplying Paris with gas at about half the price now charged; so that the present Company rely simply upon the validity of their concession. France being a law-abiding country, the Company are safe in this attitude; for it is better that contracts should be upheld, than that the population of a capital entrapped into paying too dearly for a necessary of life should obtain deliverance by lawless means. All the same, it is a pity Paris should suffer so from the peculiar rigidity of French gas legislation, and the stupidity of those who framed the Treaty of 1856. The best way out of the difficulty would be for the Municipality to purchase the undertaking at its fair value.

Gas Affairs in New York and Boston.

THERE is no news in the statement that the great gas industry of the United States is conducted according to principles which, according to our English ideas, may be styled peculiar; but recent doings in connection with the gas supply, not of any obscure "cities" of the West and South, but of New York and Boston, strike us as specially worthy of notice by those who might at some time be invited to take an interest in American gas properties. New York, already over-supplied with gas-works, and paying dividends upon an inflated gas capital, is threatened with a raid from beyond the arm of the sea known as the East River. For mentioning this circumstance, we have come in for a torrent of abuse from an American journal claiming to represent the water-gas interest—which, by the way, said nothing about the venture until we did; and it is charged against us as a blunder, and an attempt to "say "something unkind of Americans and their work," that we described the East River Gas Company as the "latest "move of the United Gas Improvement Company upon "the gas interests of New York." It is asserted, as though to the contrary, that Mr. Emerson M'Millin is at the head of the East River Company, and that this gentleman "must, and doubtlessly most willingly does, take whatever "of credit or discredit attaches to the plan of supplying "New York city *viâ* the tunnel now under construction." But this is no contradiction of our statement, in which there was nothing "unkind." We may have blundered in asserting, from information received, that the United Gas Improvement Company are at the bottom of the East River scheme; but, as they are supplying the plant, we naturally concluded that they had something to do with the project, whoever might figure as the ostensible promoter of it. Meanwhile, all our American technical contemporaries have been strangely silent respecting the serious trouble that has at length overtaken Mr. Addicks at Boston. On and after the 1st inst., the Boston Gaslight Company is ordered to sell gas at $1 per 1000 cubic feet, which is claimed to be a saving to the people of $300,000 annually. But this is not all. There is to be a thorough investigation of the method by which Mr. Addicks and his associates obtained possession of the Boston gas undertaking; and, as a preliminary, the *Boston Post* has published the Articles of Subscription to the original Addicks Syndicate, with the names of the subscribers and the amounts for which they "stood in" with this notable financier. The same newspaper describes the document as most extraordinary, and avers that "it "was undoubtedly intended to deceive, and undoubtedly "did deceive, the signers, except the chosen few who were "in the inner ring, and who in all probability made money "at every turn of the gas kaleidoscope." In the list of subscribers, the heaviest allotments appear to have been made to Mr. Addicks himself and the United Gas Improvement Company. It is alleged that the agreement as made is illegal; but this, of course, remains to be decided. We are very sorry if we misrepresent the condition of the American gas industry; but when the Mayor of Boston calls the Addicks Syndicate "the most gigantic conspiracy "that was ever unearthed in Massachusetts," an English observer of such matters may be permitted to hold the opinion that, like the "Heathen Chinee," the gas industry of the United States can fairly and gently be described, as we have already remarked, as "peculiar" in several respects, without being called "unkind" for so thinking. But this may be another "blunder."

An Eight-Hour Day for Miners.

ONE of the parliamentary events of the week has been the passing of the Miners' Eight Hours Bill through the second reading, by a very substantial non-party majority. There seems to have been some uncertainty up to the last as to the attitude of the Government, and especially as to what the Premier meant to do; because all Mr. Gladstone's public utterances on the subject, which have mainly been addressed to deputations, have been by way of exhibiting the difficulties of dealing with the matter by legislation. The last deputation seen by Mr. Gladstone was from the Mining Association of Great Britain, who urged the Government to oppose the measure on the ground that it would very seriously handicap the coal-mining industry, and, by increasing the cost of production, would impose an additional burden upon many other industries which are large consumers of coal. In replying to this deputation, Mr. Gladstone repeated the statement he had previously made to the miners—that his "pre-"judices are in favour of the system that leaves most to "individual freedom;" and three days later he voted for

the second reading of the Bill. Fortunately, or unfortunately, according to the point of view, the measure is not likely to become law this session, or it would require to be discussed at greater length than is now necessary. It is probable that the majority who voted for the second reading were inspired by the laudable sentiment that "eight hours is long enough for any man to work under-"ground." But it happens that the miners who hold this opinion are already able to act upon it; and no case has been made out for applying penal legislation to those other miners who are unwilling to endorse such a hard-and-fast rule of working. Surely, of all working men, miners can be trusted to know what is good for themselves; and if one miner or ten thousand miners conclude, in one sense or the other, about the desirability of an Eight Hours Act, who is to override them? A very strong case was made out by Sir Charles Dilke for legislative interference with the hours of labour of boys and young persons working underground, who commonly have to be down ten hours or more to the men's seven or eight hours. The fact that the Unions do nothing whatever for these youths is not to the credit of these organizations. It is remarkable how prone some people are to invoke statutory aid towards the doing of things that the people interested in them can very well do for themselves, if they like. All sorts of people get into Parliament now-a-days; and the newspapers are very kind to agitators who possess the knack of identifying themselves with what are called "popular" causes. Consequently, when a debate occurs upon such a theme as the statutory limitation of the hours of labour of adult men, one meets with much curious argument from demagogues who think they are expressing "advanced" political views. There is Mr. Woods, for instance, who has charge of the Miners' Eight Hours Bill in the Commons. This legislator asks how, if it is right to have eight hours a day by Trade Union effort or mutual agreement, it can become wrong by legislative enactment. As *The Times* puts it, if Mr. Woods is incapable of understanding that many things are desirable and laudable if done voluntarily which it would be unjust and dangerous to make compulsory by law, he is hopelessly unfitted to have any share in the business of law-making. Yet how much of our modern "progressive" politics is vitiated by the same blunder!

The Hull Strike—Picketing.

THE Hull strike is no nearer a settlement, if by this term is meant an agreement between the employers and the strikers, than at the end of the first week. Work is going on in some of the docks; and there is no longer any talk of a sympathetic strike at other ports, with the object of bringing pressure to bear on the Shipping Federation; but meanwhile the unfortunate town is suffering severely from the presence of what may be described as the standing mob. Acts of violence occur daily; and the extra police protection which even the most "popular" newspapers admit to be necessary, costs the ratepayers upwards of £2000 a week. If the strike were to be declared at an end to-morrow, it would be long before Hull could recover from the injury inflicted upon its trade at the instigation of the Dockers' Union. Meanwhile, it is to be noted that the difficulty of protecting life and property in Hull is enormously increased by the unsatisfactory state of the law with regard to picketing. An unfortunate decision of the Courts has established the theoretical legality of picketing. But "besetting" is still unlawful; and the Hull police are being wearied to death in the almost hopeless task of keeping the strikers' pickets, with whom they cannot interfere so long as they remain quiet, from breaking into overt violence. The truth is that picketing ought not to be permitted at all, or ought to be restricted to one man. In a town practically in a state of siege, it seriously handicaps the forces of law and order; for the kind of men who when under the eye of the police are merely pickets, using "moral suasion" to keep willing workers away from the scene of a strike, become savage ruffians directly that controlling influence is removed. The law of picketing simply encourages and facilitates breaches of the peace, and should be overruled as detrimental to the public interest. It seems a defect in our constitutional arrangements that this can only be done by Act of Parliament. In the actual state of the House of Commons there is not the remotest possibility of any such measure being brought forward, to say nothing of passing.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 839.)

THE tendency towards an improvement in the aspect of business on the Stock Exchange which was perceptible a week ago has proved but short lived. Upon the re-opening last Tuesday, after the usual May-day holiday, depression rapidly manifested itself, and held on without any sign of improvement up to the close. The disturbing influences were those proceeding from Australia and the United States. Evidence is repeatedly forthcoming, in the form of further collapses, that the limit of financial troubles in the Colony has not yet been reached; while the difficulties into which certain over-inflated monetary concerns in the States have fallen, have dragged down another market which is largely dealt in on this side—viz., rails. Thus the past week was a bad one. Happily, it was a short one of five days only; and one of these—Anti-Home Rule Demonstration Day—was almost a *dies non*. One result was that the Directors of the Bank of England raised the rate on Thursday to 3 per cent., from the 2½ per cent. rate which had held good since Jan. 26—an operation which was generally anticipated. The Gas Market was a pleasing exception to the prevailing weakness; being very firm, though not over and above active. Several favourite issues have made further advances in price. Among Gaslights, the "A" still figures steadily at about the same prices as those of recent weeks, though the quotation was subjected to a little manipulation; being put up 1 on Tuesday, and down 1¼ the following day. The demand for the secured issues was well maintained, owing to the continued request for first-class investment stocks; and several of them have gone up in value. South Metropolitans were wanted; and all three issues are dearer. The "B" looks as if it were rapidly approaching a 4¾ per cent. value. A single deal in the debenture was all the business marked in Commercials, though the old stock was quoted at 2 higher. The Suburban and Provincial Companies made no show whatever. Business in the Continental was quieter; but prices of Union and Imperial moved up. Metropolitan of Melbourne bonds were further depressed by the local monetary difficulties. None of the rest presented any feature calling for notice. There was more activity among the Water Companies; and the issues of almost every one gained something in quotation.

The daily operations were: The Gas Market opened very firm on Tuesday; and prices ruled pretty high all day, while quotations moved up freely. Gaslight "A" rose 1; ditto "F" and "G," 2 each; ditto "H," 1½; South Metropolitan "A," 2; ditto "B," 1½; ditto "C," 2½; Imperial Continental, 1; and Continental Union preference, 2; but Melbourne fell 1. In Water, Chelsea gained 1½; East London, Lambeth, and Southwark, 1 each; and Kent, New River, and West Middlesex, 2 each. Wednesday was quieter. Gaslight "A" was put back 1½. Lambeth Water 7½ per cents. rose 2. Thursday also was an inactive day; and nothing moved but Commercial old, which rose 2. Friday brought much dealing in Gaslight secured issues; but quotations did not vary. Saturday evolved nothing remarkable; and all quotations closed unchanged.

ELECTRIC LIGHTING MEMORANDA.

Meeting of the Metropolitan Electric Supply Company—The Conditions of a Paying Electric Light Connection—Electric Light for Leicester.

THE sixth ordinary general meeting of the Metropolitan Electric Supply Company, Limited, has been held, under the presidency of Sir John Pender, the Chairman, who gave the shareholders a lucid explanation of the position of the Company, and added some details to the figures of the published accounts, which we briefly discussed last week. Referring to the expenses of management, the Chairman said these are for the present divided between capital and revenue on what the Auditors consider to be a fair principle, having regard to the time and attention that have been required in settling and carrying out the various details of construction; the charge to capital being a decreasing one, so that when construction is practically completed the revenue will have to bear the whole of these charges, which, Sir John Pender added, he had no doubt it will be well able to do. The Company have met with a good deal of trouble in the shape of complaints from property-owners near their stations; and the Directors have very prudently acted on the principle of buying out the malcontents rather than going to law with them. They have never found any difficulty in letting the properties they have acquired in this way; and they are getting a fair rate of interest on their purchases. With regard to the future of the undertaking, the Chairman is, of course, officially hopeful that the revenue will grow very much, and the working expenses very little. He declared that the chief difficulty in the way of profitable working at present consists in the character of the supply to the residential portions of the district. Private consumers do not benefit the concern to the same extent as commercial consumers, on account

of the greater irregularity of their demands. "The small consumer who uses all his lamps regularly is a far better customer for us than the large householder, whose normal consumption bears an extremely small proportion to his maximum requirements. Once, twice, or three times in the year he will turn on all his lamps, and our machinery has to be prepared to meet this emergency, which may come at any time." To show the great difference in the yield per lamp of various classes of customers, Sir J. Pender stated that restaurants, and other establishments whose business entails long burning hours, bring in sometimes as much as 30s. per lamp per year; whereas many private consumers average 2s. or even less. In one or two extreme cases, the Company only get a revenue of 4d. per lamp per annum. To partly meet these conditions, the Company have lately adopted a system of charging by a sliding scale; but the Chairman declares that "the time is not far distant when an effort will have to be made to obtain a minimum return for every lamp which is connected to our mains."

Declarations such as that just recorded of the Chairman of the Metropolitan Electric Supply Company are of the highest interest and importance, since they go straight to the point of the problem of commercial success in central station electric light supply. Electricians and engineers may write papers and do clever things in the way of designing generating and distributing plant; but the difficulty does not lie here. Sir J. Pender says that his Company do not actually keep plant idle for the purpose of coping with possible maximum demands which he thinks could never all arise at one and the same time. Experience is showing how far a lamp connection can be safely increased beyond the actual capacity of the machinery to supply at once; and in this way it is believed that the district of the Metropolitan Company can be filled up more closely than was originally thought possible for the generating plant fixed. This is all very well; but it is a road that cannot be followed to any great length. This is where the lack of storeage pinches a central station so sorely; for batteries are out of the question for such a large connection as that of the Metropolitan Company. Meanwhile, what Sir J. Pender has to say upon this subject and on the revenue derivable from private lamp connections should be laid to heart by members of local authorities tempted to spend public money in this kind of business by the speculative assumptions of consulting electricians.

After an adjournment of the debate on the subject for a month, the Leicester Town Council have unanimously adopted the report of the Gas Committee, recommending the establishment of an electric lighting plant on the Brush system, at a cost, to start with, of £26,977. The central station is to be at the Aylestone Road Gas-Works; and the whole thing will be an additional department of Mr. Alfred Colson's already busy establishment. The capital sum of £50,000 is to be borrowed for the purpose; and the usual assurances have been given that it is not intended to spend all this money at once. But we observe that public opinion in the town takes this assurance at its true worth. Really, the whole sum is a small one for equipping the town of Leicester with anything like a respectable and sufficient electric lighting plant. We are able to compliment the Corporation on the manner in which they have so far carried out this business. The month's adjournment has enabled several little disputes to be settled, and has secured the enormous advantage of a unanimous vote. To this result a very strong report by Professor Kennedy on the two alternative schemes and tenders selected by the Gas Committee materially contributed. So far, then, the Corporation and the Gas Committee have done all that is right and proper in the matter; but we notice in the local press that the Corporation programme is not supported unanimously out of doors. Granting that the scheme may be a good scheme, there is a strong party among the ratepayers, supported by the leading local newspaper, which holds that the town is not in a position to undertake this additional responsibility. It is argued, with the concurrence of the *Leicester Journal*, that the Corporation are not justified "in incurring so large an expenditure in establishing a scheme which will only benefit a few, and will be a heavy charge on the rates for some considerable period, at the end of which it is extremely problematical whether it will be profitable." No direct notice of this argument has been taken by any member of the Corporation; but Alderman Lennard, Chairman of the Gas Committee, has maintained the position he took up a month ago, that the electric light undertaking would pay in the long run—say, after about six years' working. He contemplates a loss of £1000 for the first year, £500 for the second, a balance for the third year, the fourth year to wipe off the second year's deficit, the fifth year to do the same for the first year's loss, and the sixth year to provide a surplus of profit. He proposes to carry forward the balances until the deficiency has been wiped out, and thereby to avoid either diminishing the gas profits or going on the rates for a penny. This is a very modest and rational expectation; but will it be realized? Those who live will see. With a sufficiency of custom and having regard to the cheapness at which the establishment will be worked, a balance may be secured in the revenue account after a few years; but, in any case, it cannot hurt Leicester to support this little tribute to the spirit of the age, which has accepted electric lighting as one of those luxuries that no town of a certain standing ought to be without. Leicester must pay for its glory.

TAXATION AND RATING.

THE subject of taxation and rating has been to the fore during the last week or two, in connection with the Budget and the report of the President of the Local Government Board on "Local Taxation," which together give a complete picture of national and local finance. There was nothing in the Chancellor of the Exchequer's statement specially referring to the gas industry, but gas shareholders and officials, in their capacity of payers of income-tax, must share the uneasiness that weighs upon the rest of their order in the community in view of the steadily increasing national expenditure and the diminishing returns from indirect taxation. The income-tax is made the beast of burden to the Treasury; and it is to be feared that the fatal facility with which a penny can be put on this impost will always tempt Cabinets to take this means of balancing their accounts, rather than run the risk of coming to grief over attempts to redistribute the load of taxation. Moreover, none of the "popular" newspapers or politicians cares to sympathize with the middle-class taxpayer, whose wants and opinions count for nothing in comparison with those of the voting majority. The "classes" are only remembered by "progressive" politicians when money is wanted; and then they are remembered with a vengeance. It would perhaps be an exaggeration to say that we are within a measurable distance of a time when all the revenue of the United Kingdom will be raised by direct taxation; but it is certain that, as a capable observer says, "indirect taxation is on its last legs. If people leave off drinking, we shall be left face to face with an awful burden of taxation and no shoulders to put it on." The example of Mr. Goschen's futile attempt to strike a new source of revenue by taxing cart-wheels is not more likely to be forgotten than the memorable project of the match-tax. There is nothing for it but to pay the income-tax with what resignation can be summoned for the pinch. There is another point to be considered, however, which is that in all probability property, and investments generally, will come into the first fresh scheme of national taxation that some future Chancellor of the Exchequer with time and opportunity for the task will propound. We are not likely to have a duty levied upon gasholders or gas-distributing plant, as is done in some parts of Europe where indirect taxation is still rampant; but the profits of the industry will be fastened upon somehow, in company with others, for further contributions to the growing expenses of government.

Meanwhile, the subject of rating is of even more immediate interest to the followers of the gas industry than that of taxation. Everybody must have asked himself on many occasions to what figure the rates are likely to rise; and the inquiry suggests the question as to the system by which money required for local purposes is obtained in this country. So long ago as 1871, Mr. Goschen, who then presided over the Poor Law Board, made an inquiry into the progressive increase of total taxation, with especial reference to the proportion of local and Imperial burdens borne by the different classes of real property. He also inquired into the system adopted in foreign countries for raising the funds necessary for local purposes; and he endeavoured to ascertain, as accurately as possible, whether or not the proportion of taxation borne by real property in this country was in excess of the share borne by the same class of property elsewhere. The Blue-book just issued by Mr. Henry Fowler, mentioned above, gives the conclusions arrived at by Mr. Goschen as the result of that inquiry. These results were based upon the figures relating to the financial operations of local authorities for the year 1868, and they showed, among other things, that during the preceding fifty years a vast increase had taken place both in rateable value and in local taxation in England and Wales. While much of the latter was classified by Mr. Goschen as "a lamentable increase of burden, except so far as it represents, not an increase in pauperism, but the more humane and at the same time more costly treatment of the helpless, the sick, and the insane," there was more which he regarded as "remunerative in many senses, and as being not so much a burden as an investment." The latter class included the cost of lighting, paving, and public sanitary work generally.

Mr. Fowler has continued the work so well begun by his predecessor; and the Blue-book which gives his statistics and observations deserves a place in every municipal office in the land. As he truly says, "the interval which has elapsed since 1868 has been an eventful one in the history of the local taxation of this country. It has been marked by a far larger increase in the amount of local rates falling directly on real property than was found to have taken place in the preceding half century. This increase has been mainly due to a continuous growth in the expenditure for municipal, sanitary, and other purposes incurred by urban authorities." In addition to these causes, the reduction of indirect local taxation brought about by the abolition of such imposts as turnpike tolls and London coal and wine duties, has thrown additional charges on the direct local taxation. Mr. Fowler does not state in this connection, as he might have done, that some local authorities have managed, through gaining control of the gas supply, to create a special kind of indirect taxation which has brought in a good deal of money since 1868.

Mr. Goschen speaks of the "astounding totals" of the receipts and expenditure of local authorities, which he gives as being £30,140,000 and £30,240,000 respectively in 1868. The corre-

sponding figures for 1891 were £57,659,414 and £57,857,077, which is a notable expansion. These figures embrace the transactions of 28,000 local authorities, corresponding to a population of slightly more than 29 millions, and dealing with a rateable value of £152,116,008. These statistics are analyzed in the report under various heads. Upon the subject of local indebtedness, Mr. Fowler remarks that the local debt has now attained such proportions that it cannot be left out of account in estimating the burdens which have been imposed on real property since 1868. It is true that a portion of it, consisting of the loans of Harbour, Pier, and Dock Authorities, is not charged on the rates; and also that a further portion, consisting of the loans raised for the purposes of water-works, gas-works, markets, and other undertakings producing revenue, is secured in many cases primarily on the revenues of the undertakings in respect to which it has been raised, and is a charge on the rates only to the extent to which those revenues may be insufficient to meet the payment of the principal and interest. Yet, after allowing for these loans, about one-half of the gross debt falls directly on the rates, which have not only to bear the interest, but also to provide for the repayment of the principal within the periods prescribed. "It represents, therefore, a liability which for many years to come will have to be met by the ratepayers of the future; and its continuous increase of late years forbids the hope that the properties which bear the rates mortgaged to secure its repayment will, within any measurable distance of time, be relieved from the additional local taxation which it has imposed on them." The gross total amount of the outstanding debt of local authorities in 1891 was £201,215,458. Of this, the purely urban debt charged wholly or collaterally on the rates amounted to £152,956,943. In this total, gas-works stand for £14,991,197; water-works, for £38,325,912; public lighting, for £46,095; and electric lighting, for £56,942. It is rather remarkable that sewerage and sewage disposal works stood for less than 20 millions at the end of 1891, which can only mean that a great deal of the cost of the sanitary improvement of English towns has already been paid off.

With regard to the average rate in the pound for England and Wales, Mr. Fowler has an interesting statement to make. The average rate for 1891 was 3s. 8d. in the pound; and, as he says, "considering the extent of the increase in the amounts of the rates raised, it is surprising to find that the average rate in the pound of the rates raised in the whole country is practically now the same as it was in 1827, smaller by 2¾d. in the pound than in 1817, and by 9¼d. in the pound than in 1803, and only 4d. in the pound in excess of what it was in 1868. The explanation is to be found in the increase which has in the meanwhile taken place in the rateable values of the properties liable to be rated." And when it is borne in mind how much more is now done for the ratepayer than was dreamt of in the early years of the century, it will be seen that the modern ratepayer has indeed reason to be thankful that he does not stand in his grandfather's shoes. The cost of poor relief alone was 3s. 4¼d. in the pound in 1803; while in 1891 it was 1s. 1¼d. in the pound, and this was reduced by the new Treasury subventions to 9·24d. to come out of the rates. This statement demolishes the Socialist allegation that while the rich have grown richer, the poor have become poorer, under the existing industrial and social system.

Since the old rates have fallen so heavily, it follows that there must have been a considerable addition to the rates as a whole in order to make up the average to the figure stated; and this is the fact. Mr. Fowler gives full particulars of the new rates, their purposes and amounts. Not only has the character of the burden of the rates altered, but their incidence has also changed. Mr. Goschen found that "speaking very broadly, in England fifty years ago land bore two-thirds of the taxation in real property, and houses and other property one-third." This was said in 1868. By 1891 the situation had changed still further; so that, of the total burden of local taxation, land then bore 15·31 per cent., and house and other property 84·69 per cent. Mr. Fowler remarks that "the urban ratepayers participated in the benefits arising from the fall in the rate in the pound of the poor rate and the disappearance of the church rate, and in some counties from the fall in the county rate; but these benefits were more than counterbalanced by the rise in the rates in the pound of the modern urban rates, especially the urban sanitary rates and the urban school board rate." He admits that the modern sanitary rates "press with severity on the ratepayers in towns where the aggregation of large populations in comparatively small areas necessitates the provision of costly schemes of sewerage, scavenging, water supply, and other works of primary sanitary importance, which cannot be neglected without serious danger to the public health."

The question that suggests itself, after study of these rating statistics, is whether the burden of the rates is likely to grow heavier or lighter with efflux of time. No satisfactory answer is possible, having reference only to the data before us. If the increase in the rateable value of English towns were illimitable, and their population were to grow as at present, it is to be supposed that the grandchildren of the existing ratepayers would have an easy time of it, because the heaviest work has been done, and it costs less per head to extend to more people the benefits for which rates are levied than to start them in the first place. The only safe conclusion to adopt is that with which Mr. Fowler winds up his most instructive report: "Having regard to the rapidly increasing demands made on local authorities, urban and rural, for disbursements in respect of the several matters within their jurisdiction, it is evident that the local expenditure, which, excluding loan expenditure, exceeded £50,000,000 in 1891 will continue to increase." The back of the people will need to be broadened to bear the burden.

THE LONDON COUNTY COUNCIL AND THE THAMES AND LEA CONSERVANCY BOARDS.

The net result of the steps taken by the London County Council, with the view of getting a footing on the Thames, and a stronger position on the Lea, Conservancy Boards was made the subject of brief comment in the last number of the Journal. But the evidence given before the Select Committee by Mr. A. R. Binnie, the Chief Engineer to the Council, deserves something more than passing notice. Mr. Binnie was present to give articulate voice to the lofty aspirations of his employers; and, solicitously encouraged by Counsel, both sympathetic and antipathetic to his view, the witness, in the parlance of the day, "gave himself away" very freely. Of course, it has long been known, particularly to readers of the Journal, that the predominant section of the County Council regards the Water Companies with envious eyes. It is true that the Companies have gradually and laboriously built up their position of prosperity; it is true, intermittent agitation and manufactured discontent notwithstanding, that the Companies have catered well and wisely for the London water consumers. All this, when the representative county councillor is driven into a corner, he must, however grudgingly, concede. But what then? The success of the Companies, and more especially their financial success, constitutes the "head and front" of their "offending." To the captious councillor, it does not seem in the fitness of things that the Water Companies should give satisfaction. The idea becomes anomalous, irritating, and intolerable. Why cumber they the ground, when the County Council are ready and willing to occupy it? "We do not care very much for the Companies," said Mr. Binnie, under the stress of cross-examination by Mr. Pember. Just so. The admission savours, perhaps, of the obvious; but none the less it should afford valuable guidance to those of the impartial public who run and read.

No less instructive was the eager attempt of the County Council, their Chief Engineer and their Counsel, to drag in by the head and shoulders the "Bogey man" of River Pollution. The Bill, it is true, had nothing to do with the question of sewage or cesspools. But the opportunity seemed golden in the eyes of the County Council; and, doubtless, keen disappointment was experienced at the check which the Select Committee felt compelled to put upon Mr. Binnie's discursive evidence. Of course, it is easy to understand that Mr. Binnie would rather see the Companies' representatives off the Conservancy Boards than on them. It would be more politic, remarked the witness, if they were omitted from membership. No doubt; and more convenient too, inasmuch as there would be the less risk of the representative county councillors being outvoted upon any attempt to encroach upon the rights, or hamper the operations, of the Water Companies.

Gently led from one stage to another, Mr. Binnie was induced to unfold the methods by which, in his view, the County Council members of the Conservancy Boards could make it "hot," so to say, for the Companies. "Now," exclaimed Counsel, "we begin to see what you would do for us if you got upon the Board. Of course, everything you can do to make the undertakings of the Companies less valuable gives you a better chance of buying them up at your own price." It was this comment which drew from Mr. Binnie the admission that, having the welfare of the people of London at heart, he does not care much for the Companies. "But," he added, in order to cover the position, and unconscious of the subtle humour of his statement, "you will give us credit for discharging important public duties." But why not discharge them in a fairer spirit? In truth, Mr. Binnie claims a great deal of credit; but he seems quite unprepared to accord any to the Companies. The painful aspect of the case is the glaring one-sidedness displayed by a great public body. "Do not," said Mr. Pope to the Select Committee, "place upon this governing body those who are avowedly hostile, who have a policy to pursue . . . without giving those interested a right, and an effective right, to ask that they should be protected by being equally represented on the Board." But, unfortunately, in this matter of the water supply, appeals to the principles of equity and justice seem to fall on deaf ears; and the collective conscience of the County Council is prepared to condone conduct which, in the case of an individual, would be characterized as grossly and scandalously unfair.

Retirement of Sir Henry Calcraft.—The approaching resignation, on account of impaired health, of Sir H. Calcraft, K.C.B., Permanent Secretary of the Board of Trade, is announced. Sir Henry entered the Department in 1852, became Assistant-Secretary in 1874, and Permanent Secretary on the resignation of Sir T. Farrer in 1886.

NOTES.

Radiant Heat and Light.

Writing in the *Engineer* on the subject of heat radiation, Mr. Luke Williams asks some questions respecting the partition of radiant energy in varying circumstances. Thus, he remarks that the calorific value of carbon has been determined many times, and is a well-known quantity. Let a pound of carbon now be burnt quickly at a high temperature, and the result will be that about one-half of its heat will be radiant, while the remainder will be imparted to the oxygen and nitrogen in which it is burnt. If, however, the same weight of carbon is burnt at a low temperature, will an equal proportion of the heat escape as radiation? Mr. Williams says he cannot obtain any definite information upon this point. Some authorities say that the sum of the conducted and radiated heat is always the same; but the amount of each bears some ill-understood relation to the temperature. Others state that the difference between the amount of heat radiated by a hot, and a very hot, body is enormous. Mr. Williams remarks upon this that, other things being equal, the greater the speed of combustion and the hotter the fuel, the greater must be the temperature of the products of combustion. But if this is so, and the weight of these products is constant, how can the radiant heat be also greater? Yet this appears to be exactly what goes on in every fire-box every day. Again, Mr. Williams asks for a good physical explanation of the reasons why the burning of coal or other solid fuel at a very high rate of speed raises the combustion temperature, while no such result is produced in the burning of gas. Thus, for example, the temperature of combustion for oxygen and hydrogen seems to be a constant under all conditions; while the combustion temperature of carbon and other solid fuels certainly is not constant. The problem thus stated is not without bearing upon the production of light by means of incandescent gas-burners; but the data upon which Mr. Williams's assertions are made need verification. Commenting upon the same subject, another correspondent of the *Engineer* states that the supreme puzzle is that heat undulations, precisely similar to those of light, transmit dynamic energy, while light-waves do not.

Electrical Ozonizers.

The latest attempt in the direction of converting electricity into something useful for the warehouse, the factory, or the home is the Andreoli ozonizing apparatus, which is designed to produce a regular supply of this supposed health-giving variety of oxygen for diffusion through the atmosphere of an enclosed apartment. This appliance can be made in a variety of forms to suit special uses. It consists essentially of an assemblage of metallic comb-plates forming electrodes, from which the silent discharge, or "electric effluve," can be promoted at will by connecting the terminals with a source of electricity and induction coils. These ozonizers are thus of the simplest character, and as their construction rests on the well-known tendency of electricity to flow off from points, their generating capacity depends only on the number of fine points which can be packed into a conveniently-shaped fitting. Thus they are made in the shape of a standard or hanging lamp, a music stand, or any other piece of furniture; and nobody would suspect that the thing which appears to be a birdcage is in reality performing the duty of keeping the atmosphere of an apartment as fresh as that of an ocean foreshore. How the production of ozone is to be tested, or its proportionate quantity arranged for, by this Andreoli apparatus is not stated.

Hints for Coke Makers.

Mr. Jones Wister recently delivered an address to the Foundrymen's Association of Philadelphia, in the course of which occur some practical remarks upon coke. He said that the appearance of good freshly-burnt coke should be a dark, shining grey mass. Examined more closely, the fracture of the cross section is found to be honeycombed with air-cells from the size of a pin's point, increasing upwards to that of the head of a large toilet-pin; while upon the longitudinal surface it will be found that the intense heat which permeates the seams of the burning mass has caused the silex and other easily-melted material in the coal to run over the surface, covering it with a beautiful gloss in some parts, and with shining beads in others. A series of experiments in the direction of making coke from anthracite culm was tried by Mr. Wister, the result of which was to show that, by adding 20 per cent. of gas tar to the culm, a splendid hard coke could be produced that would scratch glass. Inferior coke is due generally, in Mr. Wister's opinion, to insufficient bitumen in the coal. The reason why coke is so much more valuable in the blast-furnace or the cupola than anthracite, which has a higher fuel value, is on account of the air-cavities in it, which enable it to ignite through and through, while anthracite will only burn on the surface. The most highly bituminous coal makes the best coke. Mr. Wister speaks of this kind of coal as being "volatile," and desires that in analyses of coal for industrial purposes the proportions of bitumen and volatile matters should be stated separately. He appears to hold that, for the production of the best and hardest coke, it is necessary to carbonize the volatile constituents of the coal, which makes against the idea of collecting the so-called bye-products from coke-ovens.

COMMUNICATED ARTICLE.

COAL GAS: ITS MANUFACTURE, DISTRIBUTION, AND CONSUMPTION.

A Series of Articles for Gas Students.

(*Continued from p.* 730.)

GASHOLDERS.

The gasholder is designed for storing the gas as it is made, and delivering it as required into the district for consumption. In form, it is a covered cylinder which rises and falls according to the varying relations between the "make" and "delivery" of gas, and which works in and out of the tank described in the last article. It is guided in its motions by special vertical guide-framing above the tank-level, and by a series of vertical guides fixed in the tank itself. This is the plan as regards gasholders of the more general type. Those without guide-framing are referred to farther on. Gasholders may be either "single" or (if constructed in sections or "lifts," which collapse one into the other) telescopic. In the latter case, the lower guides of the several lifts other than the outer one are contained in the lifts.

The construction of the ordinary single-lift gasholder of medium size—say, from 60 to 70 feet in diameter—may be somewhat as follows: A cylindrical skeleton framing, consisting at the top of a stay ring of L-iron, termed the "top curb," upon which is formed the roof or crown of the holder—such roof having a considerable "rise" from the top curb to the centre or "crown plate." To the top curb is securely riveted a series of vertical stays of T or other suitable section, evenly distributed around the circumference of the vessel. The bottom may be formed of flat bar iron rolled to the required curve, to which are riveted two L-iron rings, either back to back with the bar-iron between, or riveted on to the latter, the one some inches below the other. The whole forms the "bottom curb," to which are secured the vertical stays just mentioned. The roof, if trussed, is supported by a central strut—usually a cast-iron pipe secured to the crown plate, and on the bottom of which is fastened a cup, strengthened with a wrought-iron hoop, shrunk on hot or riveted. Through this cup are inserted, and held by it, a series of tension-rods, which radiate to the top curb; being secured thereto either direct, or by means of brackets riveted on to the curb and to the vertical stays. From the top of the central strut along the crown are vertical bearers or rafters, which also radiate to, and are secured to, the top curb. Upon the size of the holder, and upon other considerations, will depend the number of the various members required in the roof trussing—such as queen bolts, suspenders, purlins (simple and compound), diagonal tension-rods, main and secondary rafters, &c. According to the strength required, and to the different opinions held in reference thereto by various engineers, so may vary the sectional forms, as well as the sectional areas of the respective members of the structure. But with all this diversity, one first principle is maintained throughout, in both large and small structures—namely, the employment of the sectional form best suited to meet the strains or stresses to which the particular member may be subjected. Where compound stresses are to be provided for, the section best adapted for resisting the particular two or more strains concerned will be employed.

"When the roof is untrussed, the top curb requires to be made sufficiently strong to resist the pressure of the gas exerted on the under side of the roof, which tends to distort the curb. A framework of wood or iron is required to be erected within the tank, to support the untrussed roof when the holder is empty of gas and resting on the landing-stones. The usual rise given to the crown of a holder is 5 per cent., or one-twentieth, of the diameter." (*Newbigging.*)

The whole of the top and side framing is covered with wrought-iron sheets riveted together in tiers, and so arranged as to break joint uniformly. The size of the rivets and their distances apart, centre to centre, or "pitch," and the size, lap, and thickness of the sheets, are all duly specified; the latter item being expressed in terms known as those of the Birmingham wire gauge, or B.W.G., an abstract table* of which is here given for the convenience of the reader:—

Mark or No. of Gauge.	Thickness in Inches.	Mark or No. of Gauge.	Thickness in Inches.
000	0·425	7	0·180
00	0·380	8	0·165
0	0·340	9	0·148
1	0·3	10	0·134
2	0·284	11	0·120
3	0·259	12	0·109
4	0·238	13	0·095
5	0·220	14	0·083
6	0·203	15	0·072

The joints of the sheeting are usually made of tape and red lead—the rivetting of the sheets only being done cold; while where the sheets are riveted to the vertical stays, curbs, &c., the rivets, being made of greater sectional strength, are hammered up hot, and the heads finished with a semicircular mould-shaped tool.

At intervals of equal distances around the holder are the guide columns. Until quite recently these were generally of cast iron; but of late years a marked improvement has been effected in the adoption of wrought iron for this purpose.

* From Holtzapffel's "Mechanical Manipulation."

Standards as now constructed of this material are infinitely more reliable and elastic than the older form of column. The tops of the columns or standards are braced together all around the holder by wrought-iron girders, which are not unfrequently repeated half way down the guide-framing; and in some cases a further tie is effected by means of tie-rods, which cross the bays between the columns, diagonally, from top to bottom, and are secured, where they cross each other, to a ring or other device by which they may be tightened up as required. The wrought-iron lattice or box standards (many of them now of cantilever construction), girders, tie bracing—the guide-framing of to-day as a whole—are infinitely superior, in graceful appearance as well as reliability and adaptability, to the old-fashioned, gaunt, costly, and treacherous cast-iron column and girders. Vertical guides of T-iron section are suitably secured to the columns or standards, and are placed perfectly plumb. Fixed on to the roof sheets of the holder, close to the top curb, and in positions corresponding to these guides, are the carriages, which contain the guide-rollers. The sheets are at these positions suitably strengthened for their reception. The carriages are so constructed as to permit of adjustment on the base-plates, and are so fixed as to allow of the guide-rollers (which are provided with flanges, or cheeks, on one or both sides) working freely along the T-iron vertical guides. On the bottom curb there are also fixed a similar number of carriages, bearing the bottom guide-rollers, which work in the vertical tank guides, usually of ⊔ section.

If the diameter of the holder be not considerably in excess of the depth (stated in Mr. Newbigging's "Handbook" as not less than 2 to 1), the pressure given by the vessel will be such as to render counterbalancing desirable. The method of accomplishing this is well known.

In a telescopic holder, the bottom of the upper or inner lift is so constructed as to form a deep annular channel, or "hydraulic cup, all around the lift. This may be effected by two rings of L-iron, connected together by wrought-iron plates constituting the bottom of the cup—the inner L-iron ring being riveted on to the curb; and on the outer ring are riveted wrought-iron plates or sheets, which make the outer side of the channel. The top edges of these outer side sheets are usually strenghened by a bead of half-round iron. On the top curb of the outer lift is constructed the "hydraulic dip," which is the exact counterpart, but inverted, of the cup. The bottom guide-roller carriages of the inner lift are fixed on the under side of the hydraulic cup, on the inside of the outer lift, and suitable guides are provided upon which the rollers will work. These guides also constitute vertical stays to the outer lift. On the hydraulic dip are fixed the top guide-roller carriages of the outer lift. The rollers work on the T-iron guides of the outer guide-framing; while the bottom rollers of this lift work in the tank guides.

As the inner lift is filled with gas, it rises until the cup enters the dip of the outer lift, which momentarily checks its further progress owing to the increased weight put upon the gas by the latter. This being overcome, the outer lift rises, and the holder is said to be "cupped." The cup on leaving the tank is, of course, full of water, and thus, with the dip, provides a hydraulic joint between the two sections of the holder. In winter care must be exercised to prevent accumulation of ice in this cup, as otherwise the cupping of the holder will be attended with great risk of tilting and collapse.

Mr. T. Holgate, Gas Engineer of the Halifax Corporation, was elected an associate member of the Institution of Civil Engineers at the last monthly ballot.

The Resignation of the Secretary of The Gas Institute.—Mr. W. H. Harvey, B.A., is issuing a circular to members of The Gas Institute, announcing his resignation of the office of Secretary, and intimating that the Council have appointed Mr. Frederick G. Burfield as his successor.

Water Conduits of Salt-Glazed Vitrified Pipe.—A temporary water conduit was recently constructed at Newton (Mass.) from 20-inch salt-glazed vitrified Akron pipe. Being for temporary use only, it was desirable to keep the pipe in as perfect condition as possible, so that it might be used again on sewer works. The joints were made by caulking a jute gasket 1 inch deep into the bell. Then a jute gasket dipped into neat Portland cement was caulked outside this, so as to fill the remaining space in the bell; the joint thus finished proving to have sufficient strength to withstand a pressure of 2 feet of water without leaking.

Manchester District Institution of Gas Engineers.—The 94th quarterly meeting of this Institution will, as previously announced, be held next Saturday. According to the programme issued by the Honorary Secretary (Mr. S. S. Mellor, of Northwich) there will be an excursion to the open section of the Manchester Ship Canal, *viâ* the River Weaver, for which a special steamer has been chartered. The members will meet at the Central Station, Manchester, about ten o'clock, and proceed to Northwich by rail. After luncheon, the formal business of confirming the minutes of the previous meeting, and the election of a new member (Mr. T. N. Ritson, of Kendal), will be transacted, under the presidency of Mr. W. R. Chester, of Nottingham; and then a start will be made for Eastham, *via* Saltport. Tea will be served at the Eastham Ferry Hotel; and the members will return to Manchester from the Central Station, Liverpool.

TECHNICAL RECORD.

HISLOP'S REGENERATIVE RETORT-SETTINGS, AND EXPERIENCE IN THE WORKING OF SAME.

Paper by Mr. Er W. Smith, of Cockermouth, read before the North of England Gas Managers' Association, April 29, 1893.

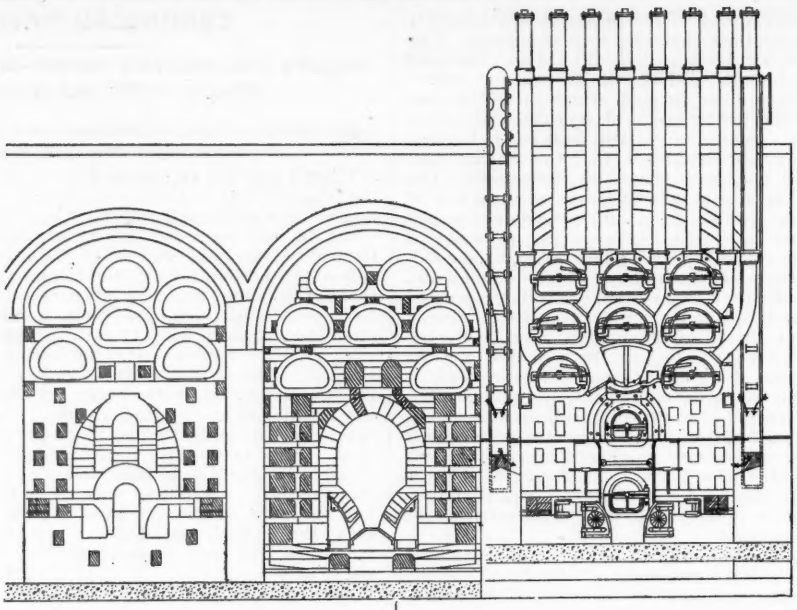
When I was first approached by our esteemed President with the proposal that I should contribute a paper on Mr. Hislop's regenerative settings of retorts, it was urged that, inasmuch as I was the only one using that system under our English conditions of working, and with softer coal than prevails on the other side of the border, my experience placed me in such a position that my testimony as to the practicability or otherwise of their more general adoption would be most valuable. I felt flattered; and, when again pressed to write a paper on the subject, and after a more extended trial of the settings, I consented.

It is now nearly two years since Mr. Hislop's furnaces were introduced into the works under my control. The reasons for the adoption of a regenerative setting were, I think, in my own case—and probably may be in many others—both strong and good. Prior to the time I speak of, our carbonizing plant consisted of three settings of fours, and one each of fives and sixes—in all 23 retorts. The former were set in ovens 6 ft. 3 in. by 10 ft.; and the oven of the bed of sixes was 7 ft. 6 in. by 9 ft.—all being heated by direct firing. I may mention incidentally that the ovens had been in existence over thirty years, and were not in very good order. We had the greatest difficulty in maintaining a fairly good and constant heat, owing partly to the bad state of the arches, and partly to their smallness. Under such conditions, it is not to be wondered at that much irritation and annoyance resulted at times to myself. Any slight neglect or irregularity on the stokers' part in attending to the fires, brought about such a reduction of temperature as could not be easily recovered. These little troubles would invariably occur in a most vexatious manner at critical periods. When, however, it was found necessary to make sundry alterations to the retort-stack, as our sale of gas was increasing, I determined on pressing for the adoption of such a retort-furnace as would require a minimum amount of attention from the men, and at the same time tend to relieve me of the necessity of spending the greater part of my time in the retort-house. I should say that I had previously had some experience in the working of regenerative settings; and my attention naturally turned to this type of furnace. But here a difficulty presented itself. Our works are peculiarly situated; and I had reason to fear that, if we had to excavate to the depth required for most regenerative settings, we should encounter trouble with water. There was no getting beyond the fact that, if I was to have a regenerative setting, the producer must be of the shallowest description; and, looking over the various kinds, my attention was most attracted by the one eventually selected—that under Mr. Hislop's patents, and which had worked so successfully at the Paisley Gas-Works.

It may be advisable to describe at this point the settings referred to, and their chief characteristics. One most important feature about them is the comparatively shallow producer and sunk chamber. A reference to the drawing before you will show that it is only necessary to excavate to a depth of 4 ft. 10½ in.; while the floor level of the sunk chamber in front of the settings is only 4 feet below the retort-house floor. The settings adopted at Cockermouth consist of two ovens of sixes. The height of bench from the floor-line of the retort-house to the top of the brickwork is 10 ft. 6 in.; and the total height from the sunk chamber to ditto, 14 ft. 6 in. The ovens are 8 feet wide by 8 feet high and 10 feet deep; the retorts being 15 in. by 22 in. by 9 ft. 6 in. The division-walls of the bench are carried forward below the floor-level to the front of the sunk chamber, and form supports for the covering-plates and buckstaves, which latter you will notice are built about 18 inches into the wall.

In the mode of construction of the producer (which is built inside the oven), the arrangement of the ash-pans, and the provision for the admission and controlling of the air supplies, Mr. Hislop has shown considerable ingenuity and skill; and he is to be congratulated on the happy arrangement he has succeeded in devising. The lower part of the producer is formed of two curved cast-iron plates—the convex side to the inside of the furnace. These are set about 5 inches apart, and are covered with silica blocks; the concave sides of the plates forming the chambers which hold snugly enough the ash-pans, of which there are two—one on each side of the producer. From the top of the ash-pan chamber, the side walls of the producer are started, from which an arch is thrown, extending the whole length of the oven. The total height of the producer is 4 ft. 7¼ in.; the extreme width being 2 ft. 8 in. A gentle slope is given from the back wall of the settings to the body of the furnace, as shown in the sectional drawings. When in action, carbon monoxide is produced most abundantly, and escapes from the producer by means of openings at regular intervals on each side of the arch, and extending the whole length thereof.

The combustion chambers into which the producer gases are admitted, are situated one on each side of the furnace, and between the two bottom retorts. The secondary air supply is admitted to the regenerator flues by means of the two apertures



situated near the bottom of the front wall, and is easily regulated by means of the sliding discs. Passing backwards and forwards several times, "sandwiched" between the side wall of the producer and the return flues from the setting above, the secondary air acquires a considerable rise in temperature before meeting with the gases leaving the producer at the combustion chamber. It may be well to direct your notice to the fact that the secondary air enters the combustion chamber at the bottom; the producer gases entering at the side. Mr. Hislop, I believe, claims for this arrangement a more regular, steadier, and complete combustion throughout the chamber.

The producer—as, indeed, all the brickwork, such as the combustion chamber, &c., exposed to the direct action of the heat—is constructed of blocks containing a large percentage of silica, to withstand the action of very high temperatures. I have not the means at my disposal for ascertaining the degrees of heat attained; but I may say that, throughout not only the combustion chamber, but the setting and retorts generally, a most even and beautiful temperature prevails. The spent heat leaves the ovens by means of the flues on each side, and next to the side walls, travelling backwards and forwards as it descends, divided only from the regenerator flue by 3-inch tiles (as shown), until it reaches the exit openings to the main flue. The latter is situated under the retort-bench; and each oven is provided with four openings, one on either side the furnace serving for the flue which runs under the ash-pans. A portion of the spent heat is conducted, by controlling the upper exit, to the lower flue; thereby compelling it to do extra duty in the evaporation of the water required for the proper formation of friable ash, instead of hard clinker, and to otherwise assist towards the efficiency of the furnace, by allowing itself to be split up into its component gases.

The primary air supply is admitted through circular openings in the ash-pan door, easily regulated by discs; and, as it passes on to the side ports leading from the ash-pan chamber to the producer, it carries along with it the water vapour, which is constantly being generated by the waste heat under the pans.

The front of the producer is covered and strengthened, besides being rendered perfectly air-tight, by means of a cast-iron plate, provided with two doors—one being above the level of the flooring plates, the other near the bottom of the furnace. The latter is used for raking out the friable ash and clinker; the upper one serving to enable the stoker to break through the arch of clinker (which always forms), and to level up the charge of fuel after replenishing. Both these openings are faced, as are also the doors to form a tight fit when screwed up.

Immediately above the producer, you will notice there is shown on the drawing the funnel-shaped hopper, which, when not required for use, fits very neatly under the mouthpiece of the bottom retort. During the operation of drawing the charge of coke from the retort above, the hopper is liberated and falls back, disclosing the mouth of the producer. After the charge is drawn, the hopper is pushed back to its place, and the producer lid closed again, with ease and facility. It is found, in the case of sixes, such as we have at Cockermouth, that the fuel from the two retorts is more than sufficient—one retort alone will almost suffice. When the doors are all shut and closed tightly, nothing further requires to be done for four hours. The combustion of the coke is most complete; leaving only a small residue of ash and clinker, which latter forms a rough kind of arch, extending from the front of the furnace to the back, the under side of which is in a line with the upper portion of the bottom door. The operation of cleaning is carried on easily, and with very little inconvenience to the workmen. I may add that we have not found it necessary to clean out oftener than once every 48 hours; and for several weeks at a time, when the retorts have not required to be pushed, we have only had to clean out once in three days. I need scarcely point to the advantages resulting from a setting that requires so little attention in the charging and controlling of the furnace, as does the one under consideration.

When the furnaces were first lit up, the usual process and interval of drying was gone through, and the period between the charges of fuel gradually shortened, until sufficient heat was obtained to burn off a charge of coal in four hours. We have had no difficulty in maintaining the four-hour duration—indeed, I may say that, were it necessary, we could easily obtain sufficient heat to carbonize our charge of soft coal in three hours, as is done with the splints and shales in Scotland. So far, we have experienced no difficulty, and samples have been tried ranging from rich cannels, splints, caking coals, &c., down to the much-advertised compound for curing stopped ascension-pipes.

The consumption of fuel is exceedingly low—working out to something like 17 or 18 per cent. of the total quantity of coke made, or a little more than 11 lbs. per 100 lbs. of coal. I give the two figures advisedly, as there is some liability to confusion if either one is mentioned alone. While dealing with the fuel account, it may not be irrelevant to state that it is the practice of some managers to determine the quantity of fuel used by deducting the coke sold from the quantity afforded per ton as found by analysis, which is most fallacious, since the coke sold contains a considerable weight of added water, with the result that the quantity left, as used by the furnaces, is reduced to the extent of the weight of water added to the coke sold. This would particularly affect the percentage of fuel used in a works where there is a ready sale for coke; and it affords a means for colouring up statements which mislead many.

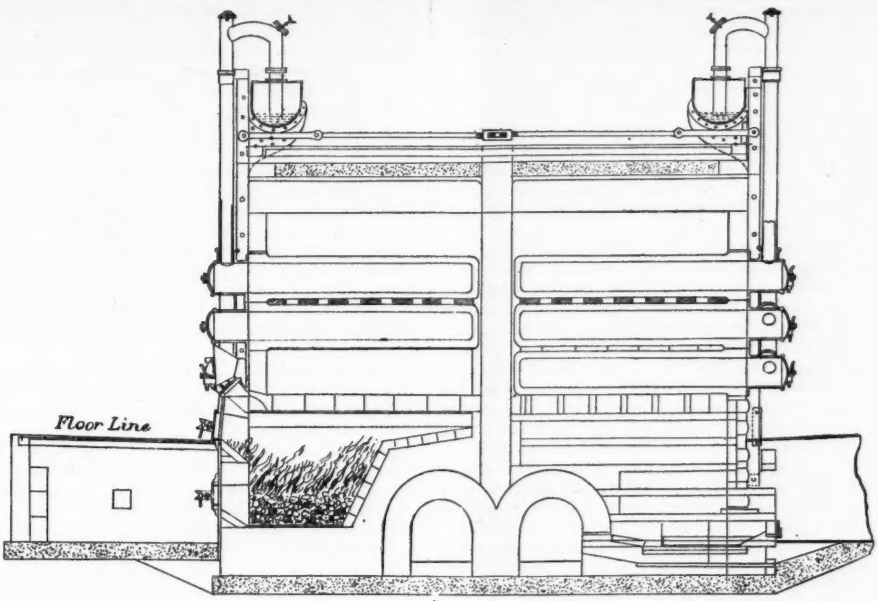
So far as my own experience goes, the greatest advantage and saving has been derived from the increased yield of gas per ton of coals over the old order of working, as shown by the following figures:—

Table showing Quantity of Gas made, Coal used, &c., from the beginning of October to the end of the succeeding March in the following years.

Coal Used.	Gas Made.	Average per Ton.	Wages for Carbonizing.	Cost per 1000 Ft.	Cost per Ton.
1890-1. 1989 ..	18,466,800 ..	9,311 ..	£224 8s. 11d. ..	2·91d. ..	2s. 3·08d.
1892-3. 2004 ..	20,926,300 ..	10,495 ..	191 19 9 ..	2·20 ..	1 10·98

The increased yield per ton represents a saving of coals to the value of £146, or 1s. 5·50d. per ton. Add to this the saving in wages 4·10d., and the saving in fuel, which, at the lowest estimate, cannot be less than 15 per cent. upon the old and exceedingly wasteful system we previously worked under. The saving under this head comes to £97, or 11·61d. per ton of coals carbonized; showing a total saving of 2s. 9·21d. per ton enjoyed by working a well-arranged regenerative setting. But this is not all, as we are told, with reason, that gaseous firing adds considerably to the life of a retort; thereby enabling it to produce more gas during its lifetime than if it had been subjected to the cutting heats of a direct open fire. So far, I have not had any of our retorts renewed; but, while on a visit to Paisley, I was informed that, when renewals are carried out, it will not be necessary to interfere with the producer or regenerator, as they are found to remain good for many years.

It should be stated, in justice to Mr. Hislop, that the settings at Cockermouth have not had an opportunity of showing off their advantages to the fullest extent. At no time have we required to carbonize more than 15 cwt. of coal per retort per 24 hours; that quantity in each of twelve retorts being sufficient



to produce gas enough to meet our heaviest demands. It should also be strongly impressed that the coal used is a local one, and very much inferior in quality to Durham, Newcastle, and other gas coals. Under more favourable conditions, therefore, much better results than I am able to put before you could be obtained. With retorts 22 inches by 14 inches by 9 feet, Mr. Hislop tells me that, in settings of eight, he carbonizes 26 cwt. of coal per 24 hours, working three-hour charges.

Within the last few months, I am given to understand, the patentee has effected several minor alterations and improvements—notably the substitution of a cast-iron plate over the flue under the ash-pans, instead of the tile shown on the drawings; thereby obtaining a more rapid evaporation of water in the pans. So far as my own case goes, however, I have found no difficulty from this source.

I feel that my paper would not be considered complete without some allusion to the cost of the settings; and I beg therefore to give briefly the terms as quoted by Mr. Hislop for the supply and erection of the several settings as follows:—

For Ovens of Eight Retorts complete (including all Iron-work, such as Mouthpieces, &c.) from Foundations, and allowing Bricks at 75s. per 1000	. . . . .	£287
Do.	Sevens	272
Do.	Sixes	250
Do.	Fives	229
Do.	Fours	203
Do.	Threes	190
Do.	Twos	156

To which a royalty charge of 30s. per retort is made in each case, and which covers the provision of all detail matter for the completion of the work. I may state further that the figures which apply to my own particular case—for settings of sixes—are borne out by the actual charges incurred.

It may be urged that, after all, the earlier principle of regeneration as carried out by the late Sir William Siemens and others is noticeable in the arrangement of the flues, &c., in the settings before you. But, while not admitting this, I think it should be remembered that there was, to say the least, room for improvement; and in the general arrangement and development of the form of regenerative furnace as designed by Mr. Hislop, there is (considering the comparatively short time that has elapsed since the introduction of this system of firing) almost as much difference as between the earlier forms of locomotive engines and those running at the present day.

The New General Manager of The Gaslight and Coke Company.—We have received the following intimation: "The Directors of The Gaslight and Coke Company have appointed Mr. John William Field, late Accountant of the Company, to be Secretary and General Manager, in succession to Mr. John Orwell Phillips, whose retirement has been necessitated by reason of failure of health."

The Constitution and Powers of the Thames Conservancy Board.—In the House of Commons last Thursday, Mr. H. L. W. Lawson asked the President of the Board of Trade if he was aware that his predecessor had declared it to be advisable that there should be a parliamentary inquiry into the composition, constitution, and powers of the Thames Conservancy Board, and that the London County Council were seeking representation on that Board under their General Powers Bill; and if he would move for a Select Committee to consider the whole question. Mr. Mundella replied that, if the Bill were passed, he presumed the object in view would have been attained; but that he would be prepared to consider the question of the appointment of a Select Committee, if necessary.

OHIO (U.S.A.) GASLIGHT ASSOCIATION.

Annual Meeting at Columbus.

The Ninth Annual Meeting of this Association was held at Columbus on the 15th and 16th of March, under the presidency of Mr. C. H. WELCH, of Athens.

The financial report of the Secretary and Treasurer (Mr. Irvin Butterworth, of Columbus) was satisfactory; and the number of applications for membership showed that the Association is developing favourably. A Special Committee appointed to co-operate with other Gas Associations in an effort to bring about uniformity in special castings for gas-works presented a report, in which they stated that, after communicating with the leading manufacturers, they found a willingness to adopt standard patterns as soon as gas engineers were ready to use the castings made from them. One manufacturer, however, had pointed out that the success of the movement must depend upon the general agreement to use such patterns.

The President delivered an Inaugural Address, in which he alluded to the progress of the Association, and to the generous hospitality of the Columbus Gas Company in granting them a permanent meeting place. The gas industry had advanced during the last year, and the competition of the electric light was less keen. This was because endeavours had been made to secure business at less than cost; the profits arising from the supply of apparatus being looked for, rather than a *bonâ fide* dividend earned by the supply of electricity. But this could not last long; and it was now found that the electric light must stand upon its own merits. So they had probably experienced the severest form of competition from electricity that they would be likely to meet with, as the argument that the future had its possibilities applied equally to gas. Against a more direct conversion of fuel in the case of electricity, they could put the hidden capabilities of the retort and generator, and of the incandescent gas-burner, the latest claim for which was a duty of 19 candles per cubic foot of gas consumed. The competition of oil was next referred to; and then the remarkable increase in the use of gas-stoves that had been a special feature during the past year, and which had led to increased consumption, not only to the extent of 20 or 25, but even of 40 per cent. Now that gas was used for so many and varied purposes, he suggested that the public could be best served by a medium quality gas at a cheap rate. Referring to the state of the tar market, he strongly urged the importance of a combination among gas companies for securing better prices, as at present tar was very cheap in England, and the tar distillers could force the price down by importing. He advocated burning the tar, wherever it would pay to do so; storeage capacity equal to at least two years' production; and such a degree of concerted action as would prevent even a single barrel of tar from getting on the market without advice. A subscription of 7d. per barrel of tar produced last year would furnish sufficient capital to start a distillery large enough to work every pound of tar produced; but possibly such a move would be too permanent in character. It was unfortunate that three of the largest Companies in the State—representing more than half the total production of tar—had distilleries at their doors, and were under contract for some years in advance. Another way in which the output of tar could be restricted, was by extending the use of water gas. If this was employed as largely in Ohio as it was throughout the States, the distillers would either have to pay more for their tar, or an equivalent in fetching it from a distance. The tar produced in Ohio should yield £55,000 per annum; and he was in favour of a Special Committee to look after this matter. In

concluding, he called attention to an exhibition of gas appliances promoted in connection with the meeting of the Association.

A paper dealing with the present state of the art of purification of gas in closed vessels, was read by Mr. S. F. Hayward, of New York. After recapitulating the advantages obtainable by the employment of such a system, he touched upon the use of the Claus process in England, the air system, the experiments in the use of air and steam, as recounted by Mr. F. G. Dexter at the last meeting of The Gas Institute, and the oxygen or Brin process as applied by Mr. W. A. Valon. Of these systems, he regarded the use of air, or of air and steam, as the only one that was really practicable.

Discussion being invited, Mr. Douglas said the advantage of air and steam, as compared with air alone, that was claimed in Mr. Dexter's paper, might be largely due to the fact that the former experiment was tried in the summer and the latter in the winter. He also failed to see how the air process could be said to economize enriching material. Mr. Faben used the air process with advantage, introducing the air at the inlet to the purifiers, by the medium of a steam injector. The proper use of steam was a remedy for any trouble caused by back pressure, due to the caking of the lime or oxide. Mr. Phillips revivified his oxide very rapidly, by spreading it in a shed heated by steam-pipes. Mr. Greenough revivified oxide *in situ*, by drawing a current of air through the material—the box being shut off for that purpose. He thus secured a considerable saving in labour. Mr. Miller failed to see the need for steam or water, as the gas was reduced in temperature, and deposited water, all the way from the retort. It must, therefore, reach the purifier in a saturated condition; and unless there was a great rise of temperature in the purifier, the water was not wanted. So far from water being absorbed, it was actually produced by the purifying and revivifying process. He preferred oxide of iron to lime for dealing with water gas; but he found it necessary to be cautious in the use of new oxide, as, if the gas passed fresh oxide last, it carried away some substance with it, that was apt to clog the burners. Mr. Bates used the air process, without steam, for purifying a mixture of coal and water gas.

Mr. Hayward, in replying, pointed out that the steam not only supplied moisture, but raised the temperature of the gas to 90° or 100° Fahr., and thus increased the activity of the chemical action.

Mr. Jerome Penn, of Washington, described a "Test of the Backus Heater." He fitted seven various sizes of this apparatus in his own house, and used them exclusively for heating during the month of December. The living-rooms were kept at 72°, others at 66° Fahr., and the quantity of gas consumed was 50,000 cubic feet. A special test was made by fixing a separate meter to the apparatus used for the dining-room—an apartment 13½ ft. by 22 ft. containing 3000 cubic feet of air space, and the consumption was 2500 cubic feet. On the 5th of March a particular observation was made. Two thermometers were provided—one fixed on the gaselier in the centre of the room; the other, near a window at a height of 5 feet from the floor. The doors were closed, and the windows opened to cool the room. At 8 a.m. these were closed, and the heater started at a consumption of 15 cubic feet of gas per hour. The centre thermometer then indicated 44°, and the side one 34°; while a hygrometer indicated 40°. At 8.20, both thermometers had risen to 66°, and the hygrometer to 45°. At 8·40, the centre thermometer stood at 70°, and the side one at 72°; the hygrometer being normal. The gas consumption was then reduced to 5 cubic feet per hour; and in an hour's time the temperature had risen to 78°—the hygrometer remaining normal.

Mr. Donald M'Donald opened the discussion by asking whether an ordinary gas-stove, with no escape for the products of combustion, would not produce results equal to those described. He understood that the Backus heater added aqueous vapour to the air of the room; but his experience showed that gas-stoves made the air too wet, and not too dry. The windows were covered with ice or moisture. It seemed to him that the additional moisture was a detriment; and he could not see how the steam-heated surface increased the efficiency. The combustion of 1 lb. of natural gas evolved 2 lbs. of water, so it was folly to seek to charge the air with more water. The maker of the Backus heater prided himself on keeping the air wet, while he (the speaker) had been trying to keep it dry. Of course, if a flue was used, the moisture would be carried away. The Backus heater was said to destroy the air—causing fresh air to replace it; but everyone knew it was only the oxygen that was consumed or converted into other compounds. So he failed to see how a gas-stove could be used without proper provision for ventilation; though at the same time he knew as a fact that gas-stoves were used without flues, and yet the air remained fresh. Mr. Miller observed that the flame played upon asbestos, in which case it was impossible for perfect combustion to obtain; and the air would be contaminated with carbonic oxide. A heater with ordinary illuminating burners would give more complete combustion, and consequently a better duty. With regard to the use of gas without special means of ventilation, it was generally claimed that in air-closed apartments having 12-inch brick walls, the atmosphere was changed every hour. Mr. Roper said his brother had employed the Backus heater, and found it useful in mild, but not strong enough for very severe weather. Mr. Shelton remarked on the discrepancy between the dining-room test, which showed 2500 cubic feet, and the total consumption of 50,000 cubic feet. Mr. Starr objected to gas-stoves without flues. Mr. Taylor had used a Backus heater, and did not find the air more unpleasant, or containing a greater amount of moisture, than when a gas-stove with a flue was employed.

Mr. Penn, in reply, said he did not think any other stove afforded such good combustion, or efficiency, as the one he had described. As to condensation on the windows, this arose from causes other than any excess due to combustion of gas, such as the difference between the internal and external temperature. The Backus heater kept the atmosphere normal as regarded moisture. The hygrometer registered 100, and the normal point was 50—anything below this being too dry, and above it too wet. Professor Tilden, of New York, had spoken highly of the quality of the air in a room heated by this apparatus; and personally, after using it throughout his house, he felt no inconvenience whatever on the score of bad air. Besides the seven heaters, he had continually in use a circulating hot-water apparatus heated by gas, as well as a gas cooking-stove; and this would go to explain the discrepancy noticed by Mr. Shelton. He also thought there had been waste in getting some of the rooms too warm.

Mr. H. L. Hurlburt, of Oberlin, next read a paper entitled "Should Small Gas Companies put in Electric Light Plants?" He described his own experience, having put down a plant in view of a reasonable prospect of getting the public lighting; but, after every possible inducement, he failed to secure the contract, on account of a prejudice in favour of the street lighting being undertaken by the public authorities. There was also the fact that municipal ownership was more practicable in small than in large towns. It therefore appeared advisable that small gas companies should proceed slowly in the matter of electric light installations, and especially that they should definitely secure a long-period public lighting contract, before putting down the plant; and it was a question for discussion how far they could go with advantage in the matter of dividing up their business between gas and electricity. He suggested that reliable information as to cost of working the electric light should be collected by the Association; he having been confronted with low figures which he was not in a position to controvert.

Mr. Nash commenced the discussion by observing that Mr. Hurlburt had been advised to put in the electrical plant by persons interested in supplying the machinery, whose advice should therefore, he said, have been regarded with caution. He thought it was better for the town to run the arc lamps, and the gas company to keep to the gas, in a small district. He knew of cases where electric lighting companies had sold a plant to the local gas company, and a short time afterwards a second lot to their competitors. Selling the apparatus was all they cared about. In his town there was an opposition electric light company; but they did not do him much harm, and people were more satisfied with the gas since there had been competition. They were satisfied with the charges for gas; but they were always complaining about those for the electric light. Instead of trying to keep out opposition, which could not be effectually done after all, a better and more satisfactory result would be obtained by spending money in improving the gas plant. Mr. Greenough thought the paper opened up the important question of proper protection to capital invested under the laws of the State. Its owners ought not to be robbed by any person, company, or municipality. Especially at this time, when the subject of the municipal ownership of corporations of all kinds was "in the air," he thought it desirable that in Ohio they should follow the lines adopted in Massachusetts, and have a State Gas Commission to protect their legitimate interests. Two years ago a Municipal Lighting Bill was passed in Massachusetts, which allowed the local authorities to undertake public or private lighting if they wished, subject to certain provisions, one of which was the buying up of existing concerns at a fair price, to be fixed by the State Commissioner in case of dispute. It was also necessary that the vote authorizing this undertaking should be agreed to by two successive city councils, and by a public vote in addition. The Commissioners regulated the price and the quality of the gas to be supplied, and allowed no competition; and the law had worked satisfactorily to all concerned for the last ten years. Where a gas company supplied both gas and electricity, the corporation could, if they chose, buy up the electrical department and leave the gas. A long contract could not be regarded as proper protection for capital. Companies actually supplying electricity were as much interested in this question as gas companies; and, both working together, they could command considerable political strength. The methods adopted by municipal corporations in preparing their estimates of cost were criticized by several speakers; and Mr. Penn remarked that at Wilmington the town supplied one so-called 2000-candle power electric lamp for 12s. 6d., two for 20s. 10d., or three for 29s. 2d. per month. Mr. Starr, as an electric lighting man, remarked that the element of depreciation was not sufficiently considered in preparing these estimates. In fifteen years' time the plant would not be worth 10 per cent. of its first cost. He quoted an example from actual practice, showing that the cost of repairing and renewing engines that had been running for five years, was more than one-half of that of new ones. Every pole in the streets would be rotted in less than fifteen years; the lamps would be used up; and the guy-ropes would

have to be renewed every few years. Consequently, instead of depreciation being put at 5 or 6 per cent., it should be from 7½ to 10 per cent. In one instance, after expert examination of the books of a municipal corporation, he found the actual cost of the arc lamps to be nearly £18 per annum—more than three times as much as the official estimate. He put in an electrical plant seven years ago; and he was then told, on the highest authority, that he could supply 150 arc lights at a total expenditure of £3500 or £3600 per annum. But, in practice, the question of wear and tear made some difference in these estimates. He was working both arc and incandescent lamps; and he could assure the meeting that it was uphill work to run an electric light plant. Mr. Persons remarked that the official return for Massachusetts showed that, out of 59 electrical supply companies in that State, 54 were working at a loss. He knew of several instances where the introduction of the electric light in small towns was followed by an increased demand for gas. Mr. W. M'Donald said that, after very careful investigation, he should answer in the negative the question suggested by the title of the paper, as it would pay a small gas company much better to spend their money in buying new apparatus to enable gas to be sold cheaper. Mr. Boyle supported Mr. M'Donald's views, after five years' experience with an opposition electrical company. The company were now in difficulties, as their five-year contract for the public lighting had run out, and they were unable to effect a new one, and were threatened with competition—the latter at the instance of parties interested in selling machinery. Of course, while two electric companies were fighting, his business might suffer from the low prices; but he thought he could hold out, as it would only be temporary. Mr. Gwynne said the information required by Mr. Hurlburt could be obtained by his joining the National Electric Light Association.

"Is the Wilkinson Process Economical for Small Works?" was the subject of a paper by Mr. J. F. Seamon, of Uniontown (Pa.), who described the plant as consisting of a generator, carburetter, bench of retorts for fixing the carburetted gas, and the usual purifying and storing apparatus. It was put up before he took charge of the works, and was intended to be equal to the production of 100,000 cubic feet of gas per diem. The naphtha was vaporized in the carburetters by high-pressure steam-coils; and the fixing retorts consisted of a through bench of two, 14 in. by 26 in., and 18 feet long, which required to be maintained at the heat usual in coal-gas works. His annual make was 15 millions—averaging 20,000 cubic feet per day; and he did not find it economical to run so large an apparatus for producing this quantity. It had been fixed in the hope that a great portion of the uncarburetted gas might be sold as fuel gas. He described the sources of expense or waste as (1) the loss in getting up the heat in the generator; (2) the expense of naphtha, as crude oil could not be used; and (3) the fuel and labour required for heating the fixing-retorts, which must be maintained ready for use whether or not the other parts of the apparatus were worked. Indeed, these two retorts were equal to the production of 24,000 cubic feet of coal gas per day, or more than his consumption. He had tried making oil gas in them, by introducing the oil through a 4-inch pipe reaching nearly to the back, and had obtained a fair quality of gas; but it was liable to smoke. A water-gas plant of the cupola type was much the better one for his requirements. He knew that the Wilkinson process was in favour in many large works; and he could quite understand this, as any desired quality of gas could readily be made with it. The working was simple, and under control at all stages.

The first speaker in the discussion was Mr. Miller, who questioned whether the results mentioned respecting the working of the apparatus were not as objectionable on the large as on the small scale. It was claimed as being equal to the production of a high and uniform power gas; but, he asked, would not the cupola apparatus do this? He thought that, speaking generally, the superheating process had been abandoned. Mr. Shelton considered the paper rather inferred that the Wilkinson process was the better one for big works; and therefore it should be mentioned that, even in the largest establishments, it was being displaced in favour of the cupola process. Mr. Seamon, in the course of his reply, stated that the process had only been worked for three months at Uniontown. About 8 gallons of naphtha were required per 1000 feet of gas made; and no record was taken of the illuminating power.

(To be continued.)

Dr. Dvorkovitz on the Gasification of Coals and Liquid Hydrocarbons.—At the meeting of the London Section of the Society of Chemical Industry on Monday evening last week, Dr. Dvorkovitz read a paper on the above subject, which gave rise to an interesting discussion. Our report of the proceedings is in type; but we are compelled to hold it over till next week.

The Vertmarche Gas-Lamp.—With reference to the paragraph on this subject which appeared last week, we learn from the Solicitors of the Deimel Light Company, Limited, that although the original action against Messrs. Henry Greene and Sons for infringement had to be dropped through a technical difficulty, proceedings have by no means been abandoned; and a fresh action will be commenced in the course of a week or two.

APPLICATION OF THE INTENSE HEAT OF GAS TO THE SUPERFICIAL TRANSMUTATION OF METALS.

The process invented by Mons. A. Bandsept, of Brussels, for the coating of metals is already known. It is based upon the mechanical pulverization of the impregnating materials, which are drawn, by means of a jet of compressed gas, on to the surfaces, raised to a high temperature, the physical properties of which it is intended to transform. Last June an improvement was effected in the process; the object being still the exterior *transmutation* of the metals, but with this particularity—that the jet of gas employed caused the heating of the surfaces at the same time that it drew forward the gas-borne substances intended for impregnation. When these are sensitive to heat, they can be decomposed by this agent at the precise moment when their incorporation takes place; so that by this incorporation they may have undergone industrial transformation. A metallic weft being given, it is possible, by this physico-chemical method, to completely change its substance; so that, after the operation, it will have an absolutely new texture, possessing properties entirely different from those which formerly existed.

Very intense heats are indispensable to the success of operations of this kind, as the surfaces to be transformed should take instantaneously the temperature of the flame, and become cool as rapidly, in order that conduction should not have time to produce its effects in the mass of the metal. In order to develop a very intense heat, it is absolutely necessary to realize the conditions essential to perfect and complete combustion, which besides conduces to a more useful yield. The gaseous state fulfils these conditions better than any other, inasmuch as it permits of the intimate mixture of the supporter of combustion with the combustible, and of the perfect regulation of the proportions required for total chemical combination. In fact, effective combustion, for an industrial purpose, is a question rather more of air than of gas; as, for a given quantity of fuel, there is no other control than that which is derived from the supply of air. Moreover, as the direct effect of the union of carbon with oxygen consists in the formation of carbonic acid, it is towards this result that effort should be directed whenever it is desired to produce heat economically. The appearance of carbonic oxide, even as an intermediary compound, is always accompanied by an important loss of heat. Further, as the carbon does not combine entirely with the oxygen, except when the latter is in excess, and the affinity of the hydrogen for the oxygen being greater than that of the carbon, it may happen, in certain cases, that the whole of the first element unites with the oxygen, while part of the carbon escapes the reaction. This occurs even when the oxygen is present in sufficient quantity to saturate the combustible.

Incomplete combustion is the great evil against which we have to contend in practice; and up to now it has only been in the laboratory that anything approaching rational combustion has been effected. This imperfection in application results solely from the little care bestowed upon the composition of the combustible mixtures, the power of which is sought to be utilized. The only way to ensure the perfect utilization of a gaseous combustible is to mix it intimately with oxygen or atmospheric air. The composition of this mixture is a matter of the highest importance; it is only by making it beforehand that it is possible to succeed in so exactly proportioning the air or the oxygen as to realize the conditions of the process either of explosion or of silent combustion. By acting in any other way, we run the risk of excess.

Now, every variation in the quantities of gas and air indispensable to rational combustion appears in a corresponding reduction of the heat set free. When the supporter is in excess, the heat of combination is reduced, owing to the quantity of inert gas which enters into the reaction, and is heated up at its cost. Hence the necessity for having a mixture well proportioned, intimate, and ready in advance for utilization, for any purpose.

The mixture should be exactly proportioned and intimate; and the combustible should be in a state of division and of purity sufficient to facilitate the absorption of the quantity of oxygen required for saturation. In this manner is determined *the greatest number of elementary reactions in a given space and time.* By forcibly reducing the distance of the molecules of the gaseous bodies in presence, it is possible, as M. Bandsept explains, to compel them to move in each other's sphere of action, and, by thus increasing the number of points of contact in the mixture produced, to change relative cohesion into a chemical one, much closer. When the critical point of such mixture is near attainment, there is established an equilibrium between the attractive power of the elements and their vibratory state, which assures to the compound a permanent stability, permitting of its employment under the most favourable conditions, either on the spot or at a distance. The chemical affinity of the elements thus reunited opposes itself to the effects of the different specific gravities of these elements. There is consequently no fear of the gases which are thus diffused one in the other having a tendency to ultimately separate. The intimate association of the combustible and the supporter, effected by natural selection, brings about absolute reactions, which set in operation the greater part of the molecular forces stored up in the elements in presence. The essential and determinating conditions of perfect combustion are, therefore, the immediate and necessary

consequences one of the other—an interesting feature which heightens the importance attaching to each of them.

The new method which substitutes molecular actions for the effects of mass, to which the ordinary heating processes are confined (even those which characterize the employment of liquid and solid combustibles broken up by pulverization, and injected with a jet of gas or steam as the carrier), lead to much better results than those with which we have had to be satisfied up to now. In fact, with the mixture previously prepared, exactly proportioned, and emitted under pressure, the whole of the elements of the gases in presence enter almost instantaneously into combination; while, in the usual systems of heating, the combustion is retarded, because the mingling is only effected gradually. Thus with the rational process the tension of dissociation is *raised*, which permits of the recuperation, in a certain measure, of the difference found between theory and experience —about 700° C. for gas burnt with cold air. It is probable that, in the case now under consideration, dissociation follows on the inert element of the air; each atom of combustible, at once, finding its equivalent with which it combines. The highest temperatures readily obtained, in practice, have rarely exceeded from 1200° C. to 1500° C. up to now; while with the prior admixture, intimate and well proportioned, they reach 2000° C. to 2200°C. Naturally the yields are better in proportion to the elevation of the temperatures; and though in this class of researches the *a priori* data cannot be formulated with precision, we can estimate that, in the greater number of cases, these yields exceed by from 15 to 35 per cent. those ordinarily established for industrial applications of heat. Everywhere the insufficiency of the calorific output is manifest; but there is nothing astonishing in this, when we take into consideration the defects of the methods actually in use. The enormous difference between the effective yields and the absolute values of the energies put into operation must be attributed to the fact that the means at our disposal differ completely from the natural process. This requires a multiplicity of profound reactions brought about by the small elements called into activity; while we confine ourselves in most cases to effects of mass, which, as such, limit themselves to imperfect contacts.

The *intense heat* employed in the transmutation of metals may be engendered in different ways. To prepare the combustible, use is made of dynamic and static mixers, working separately or in combination, according to the degree of perfection to which it is sought to arrive in the composition of the mixture. The former are generally pumps, ventilators, or other machines capable of delivering the gas and air in definite proportions. They may also be constituted by combinations following the principle of the injector, and may act by the lateral in-drawing of one of the fluids, and its subsequent pulverization by the initial jet. The static mixers are for the most part, based upon the progressive division of the gaseous masses, compelled to circulate through baffle-plates of perforated metal in sufficient number to complete the mixture furnished by the dynamic appliances. Under every condition, the mixture should submit to three effects—viz., superficial shock by volumes, multiple friction by jets or small streams, and molecular lamination—all determined by its draught into, and its passage through, the comminglers. By means of this mechanical trituration, the combustible mixture becomes so perfect (so uniform in its entire gaseous mass) that it supports, without inconvenience, very great compression, which may be followed by prolonged storing—an important advantage which allows of its conservation and its transport, so that it may be employed whenever and wherever determined. In fact, the gases are so diffused that they exist as a permanent mixture, somewhat like the one found by suddenly refrigerating the elements of partial dissociation—even after combination has been effected, and when time is wanting for their recombination.

In the accompanying illustration (fig. 1) is shown a simple method of making the mixture of the elements intended to enter into combination. It consists in arranging, in zigzag order, along the interior wall of a cylinder open at either end, a series of slit burners supplied with ordinary illuminating gas under pressure. The jets, starting from the same transverse section of the cylinder, and being thrown forward with force, meet each other, and spread out in a layer, through which the air drawn into the cylinder is obliged to make a passage for itself; the result being the mixture of the gas and the air. Under this form, the obstacle may be renewed as frequently as is required to render the mixture intimate, on condition that the air is driven forward with sufficient force to traverse the cylinder for its entire length. As the latter opens into a pipe of comparatively small diameter, the composite gas meets with a certain resistance by passing outside; so that, for each ring separating two consecutive ranges of burners, there are produced two actions in a contrary direction. The gas, projected in the direction of the axis of the cylinder, gradually approaches the circumference, at the same time undergoing successive expansions, favourable to its saturation by the air, which enters in the opposite direction. The degree of division of the combustible, and intimacy of the mixture, depend upon the intensity of the gaseous jets, and upon the speed at which the air in the conduit moves. The ultimate combination is in ratio to the work applied and stored up during trituration. When the projecting force of the gas-jets becomes very great, and the current of air acquires considerable speed, there ensues a partial dislocation of the hydrocarbure between the elements of which the oxygen penetrates so much the more easily. This circumstance thus contributes to render their mixture more complete.

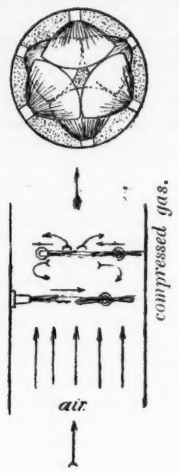


FIG. 1.

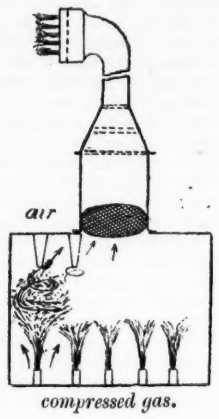


FIG. 2.

Other arrangements, having in view the commingling of gas and air, may be made. For example, the receptacle intended for the mixing operation may, as shown in fig. 2, have upon its lower part emission-holes by which the gas is caused to project itself against jets of air forced in by centrifugal pulverizers fixed in the upper portion of the receptacle. The gaseous molecules, disseminated by the shock, are very soon drawn into an aëriform vortex, and end by participating therein. As it is here a question of an induced movement, the two gyratory currents flow in opposite directions; so that the system fulfils one more of the principal conditions required for a methodical mixture.

The canalization and utilization of the combustible mixture are effected, with perfect safety, according to the principle of the absorbent power of wire gauze—that is to say, by interposing, at certain points over the entire length of pipe, pieces of gauze of close mesh, plates containing numbers of small perforations, &c., superposed in sufficient quantity to prevent any deflagration extending behind the burners. Besides, the latter are constructed upon the same principles; and, in regard to arrangement, they may take the form of injectors with variable jets, or that of the blowpipes ordinarily employed in industrial operations. The essential thing is to concentrate the furnace in as confined a space as possible, in order to develop the maximum amount of calorific intensity at the very points where it is desired to collect the effects of combustion. It is just the opposite of what one is led to do in ordinary applications, in which it is a good precaution to develop flame, in order to hasten combustion. By this it will be seen how defective are the conditions under which one generally works.

In the manipulation of intense heat, the flames could not turn back towards the canalization, unless the pressure under which the composite fluid is emitted were cut off. But even then they would be very speedily extinguished, since rational combustion yields as a product only inert gases. The intense heat resulting from complete combustion gives rise to a curious phenomenon, which M. Bandsept calls *inverse convection*. The products, being heavier than they are under ordinary circumstances, do not take an upward direction; and the equilibrium in the mass is established by isothermic layers, superposed in an order different from that which the law of least resistance assigns to active gases generated from imperfect combustion.

As specified at the beginning, the jets of intense gas, led under pressure, bring up to the point of ignition the surfaces to be transformed, at the same time that they carry along the substances, in a condition of extreme pulverization, with which it is desired to impregnate the metal. Only the upper surfaces of the latter are penetrated by the heat, which is communicated in so short a time, and with so great intensity, that the calorific movement is powerless to reach the lower layers. It exerts itself by preference upon the exterior, where it encounters less resistance, and where it constitutes an active zone (of scarcely a few tenths of a millimetre), upon which the gasified elements, carried forward with extreme rapidity, act by shock, as hard and solid bodies would do. These elements embed themselves in the molecular interstices which the heat has momentarily distended, and become incorporated with the surface the instant it returns to its normal temperature; the pores of the metal contracting. Now, this latter phase of the action is of very short duration, seeing the small quantity of metal which has been subjected to the heating operation.

Instead of projecting the impregnating materials—welding them eventually in their passage from the injector to the surface of the metal—one can still apply to it beforehand a thin coating, an impalpable layer of the body with which it is desired to cover the metal, and which is fixed upon the latter by means of the burning jet of intense gas. The same phenomena are

reproduced as previously; that is to say, the heat is confined to the surface—the conductivity of the metal not having time to come into play in the very short interval which suffices, in intense combustion, to impress upon the outer molecular layers the receptive capacity necessary for incorporation. The attack made by these intense heats enables us to reach directly the bodies of which we desire to modify the physical properties, even when they are at a relatively low temperature. Treated by the method of rational combustion, the surfaces very quickly acquire the temperature of the flame, without this having to suffer deperdition of such a nature as to prevent the continuity of its effects, or interfere with the benefits resulting from regular and continuous action.

The superficial transmutation of metals—that is to say, the modification *ad hoc* of some of their physical properties—appears to be called to play a very important part in a great number of industrial applications. More often than not, the materials at our disposal fulfil in only a very incomplete manner the conditions—frequently opposite—necessary to arrive at the solution of certain problems in the domain of practice. In general, the texture of metals does not possess the qualities required for their surface; and in many cases the necessity for coating them will make itself strongly felt. What value should we not attach to the absolute conservation of works of art, to the preservation of the hulls of vessels, &c., if these results could be obtained by simple and economical means? On the other hand, in a number of industrial applications there would be a distinct gain by annihilating certain defects; for example, conductivity, absorption or radiation of heat, occlusion and capillarity, &c.—all actions which we are compelled to counteract by means of more or less ingenious artifices, but the employment whereof always entails additional expense, and leads to inconvenience from the point of view of utilization.

The principles of the superficial transmutation of metals are, briefly, the rapid heating of the surfaces under the action of very high temperatures, in such a way as to dilate only the uppermost atomic layers, and the quite as sudden cooling which naturally ensues. Between these two phases, which are of very short duration, is effected the incorporation of the substances which are to serve as the coating. The transmutation results, therefore, from two combined effects, as M. Bandsept says—*viz.*, *molecular adherence* (of the coating material) and *superficial tempering*. Now, in certain cases we can confine ourselves to the latter result; so that the tempering becomes an operation carried out by the good regulation of the temperatures brought into use. This direct treatment furnishes results quite as marked as the electrolytic process recently discovered in Belgium, and an account of which was given in a "Note" addressed to the Academy, and which moreover is a process of high scientific importance. According to M. Bandsept's theory, the very high temperature obtained from the rational combustion of gas, applied to the metal, produces a sort of atomic pulsation at its surface. As in reciprocal action occurring in every natural phenomenon, one of the phases divides itself into a far larger number of so much more minute particles as the intensity of the double action is greater in a given space of time.

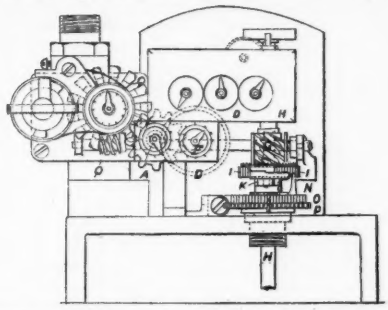
Issue of Further Capital by the Bristol Gas Company.—Our readers will see, by an announcement which appears in our advertisement columns, that Messrs. Nichols, Smith, and Alder will offer for sale by auction at Bristol, on the 18th inst., £25,000 of stock in the Bristol Gas Company, in lots of £100.

Institution of Civil Engineers.—About four years ago, the Council of this Institution decided, with the view of permanently associating the Secretary (Mr. James Forrest) with the work of the Institution, to have his portrait painted, and placed with the others which now adorn the walls of the building in Great George Street. As many of the members expressed a desire to have an engraving of the picture, a Committee was formed, outside the Council, to obtain the funds. After the project was carried out, there was left a balance of about £500, which was devoted to the establishment of a James Forrest Lectureship. The first of the lectures was delivered last Thursday evening by Dr. W. Anderson, F.R.S.; his subject being "The Interdependence of Abstract Science and Engineering." The President (Mr. Harrison Hayter) occupied the chair; and there was a large attendance. Mr. Forrest, however, was unable to be present, owing to ill-health. In the course of his lecture, Dr. Anderson showed how the history of abstract science (by which he intended to designate the history of researches entered into for the sole purpose of acquiring knowledge of the operations of Nature and of her laws, without any thought of reward or expectation of pecuniary advantage) had had its reflex in the records of the engineering profession, and how the most recondite investigations, apparently unlikely to have any direct influence on their practice, had in course of time become of cardinal importance. He also pointed out how, in these days, the engineer must banish from his mind the idea that anything could be too small or too trifling to deserve his attention. There was, he said, nothing in natural science which would not, sooner or later, prove of advantage to the members of the Institution, and which the engineer would not, in time, turn to the moral as well as to the material advantage of the human race. A cordial vote of thanks was passed to the lecturer.

REGISTER OF PATENTS.

Prepayment Gas-Meters.—Hawkyard, J., of Saddleworth, and Braddock, J., of Oldham. No. 8410; May 4, 1892.

This invention relates primarily to improvements upon the automatic apparatus described in patents Nos. 12,584 and 14,655 of 1890; the objects being: First, to indicate the exact number of coins which have been placed in the receiver, independently of the quantity of gas supplied; secondly, to afford means for altering the exact amount of gas supplied for a certain payment, so as to regulate it in accordance with the fixed price of gas for the time being; and, thirdly, to render the closing of the stop-valve more certain.



On the outer end of the arbor driven by the stop-wheel Q (mentioned in patent No. 14,655), a small index or pointer A is fitted, so as to work in front of a dial marked from 1 to 12, and show the number of pence placed in the receiver. On the other end of the arbor is a small pinion, driving a spur-wheel D having twelve times as many teeth; and on the arbor of this wheel, is an index or pointer, working in front of a second dial F also marked from 1 to 12. The first therefore indicates the pence corresponding with a portion of a revolution; the second, the number of shillings corresponding with each full revolution of the first.

For the purpose of setting the apparatus, in order to deliver a greater or less quantity of gas for each coin paid into the receiver (so as to coincide with the fixed price of gas for the time being), the mechanism is as follows: Instead of having a worm at the upper part of the ordinary vertical shaft of the meter, for the purpose of actuating the first motion-wheel of the apparatus (as mentioned in patent No. 12,584), the worm G is mounted loosely upon the vertical shaft H; and it is fitted with a spring, which acts as a brake. Secured to the lower side thereof is a ratchet-wheel I; and beneath the latter, on the vertical shaft, is an arm K carrying a pawl, which, when thrown into gear with the teeth of the ratchet-wheel I, connects the worm G with the vertical shaft H, and causes it to drive the delivery apparatus. When, however, it is thrown out of gear, it releases the worm; and the vertical shaft will then revolve without acting on the apparatus. The pawl is provided with a spring, which acts as a friction brake, and prevents it from being accidentally thrown into or out of gear.

The pawl is put into gear once each revolution of the vertical shaft, by means of a fixed incline or a spring, attached to the back plate of the meter; and it remains in gear until it is lifted again by an adjustable incline or projection N (hereafter described). The action of the apparatus, instead of being continuous as heretofore, is then intermittent, and only continues for a certain portion of each revolution of the vertical shaft H. It will thus be obvious that, by adjusting the position of the incline or projection N, the duration of the action of the machine can be lengthened or shortened; and thus the amount of gas delivered for a certain payment can be regulated. For this purpose, the incline or projection N is connected to a rim O, projecting from a worm-wheel P, placed loosely on the vertical shaft H below the pawl arm K; and this worm-wheel can be turned by means of a worm, so as to set the incline N either nearer to, or farther from, the fixed incline or spring, and thus shorten or lengthen the time during which the pawl remains in gear. The end of this worm is so fitted that it can be turned only by a key in possession of the proper person; and the keyhole is closed by means of a seal or otherwise, so as to prevent fraud.

The rim O is graduated, and is marked with various prices corresponding with the usual fluctuations in the price of gas per 1000 cubic feet; and if the price of gas increases, the incline N is set forward, so as to lengthen the time of action of the ratchet. This shuts off the gas quicker, and delivers a proportionately less amount for the price paid, and *vice versâ*.

In order to ensure the perfect closing of the stop-valve when the amount of gas paid for has been consumed, instead of having the valve on a horizontal spindle as heretofore, it is fixed on a vertical spindle, whereby it is more certain to maintain a central position with regard to its seat, and therefore to close with greater accuracy. It is actuated from a horizontal sliding spindle, by means of a bell-crank lever or otherwise; and to further ensure the closing of the valve, it is preferred to have two valves, one above the other, working separately on independent seats—the upper one being raised by the lower one, so that, if one should fail to close perfectly, the other can remedy the defect by closing on its seat. There are therefore two chances instead of one of making the closure perfect.

Maintaining Telescopic Gasholders in their Working Positions.—Pease, E. L., of Stockton-on-Tees. No. 9131; May 13, 1892.

This invention refers to the use of wire ropes or their equivalents, in connection with columns "for the better maintaining of telescopic holders in their true working position." By this means, it is possible, says the patentee, to make the lifts of such holders shallower in proportion to their diameter than is possible when columns alone are used.

The lower lifts are guided between columns, in the usual manner; and the upper lifts rise above the columns. Ropes (three or more in number) are led over the holder—each from the top of a column on one side to the ground level on the other side, or thereabout. The

rope in each case is so connected with the holder, that the descent of a lift on the one side gives the amount of slack required to permit of a like descent on the other side, and *vice versâ*. Not only are the sections or lifts which rise above the columns controlled by this mechanism, but also the lifts between the columns.

Fig. 1.

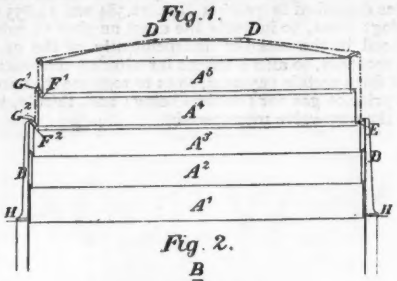
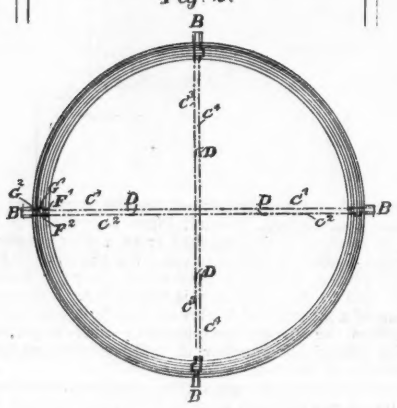


Fig. 2.



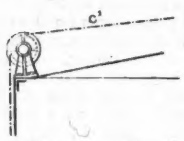


Fig. 3. *Fig. 4.*

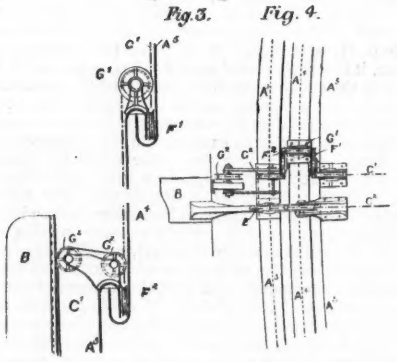


Fig. 1 is an elevation, and fig. 2 is a plan of a telescopic holder, controlled in the above-described manner. Figs. 3 and 4 show parts of figs. 1 and 2 enlarged.

A^1 A^2 A3 A4 and A5 are lifts of a telescopic holder, connected by dip-joints arranged in the ordinary way. As is seen in fig. 3, B are columns, of which any number may be provided, ranged around the holder. They furnish elevated points for the attachment of the control-ropes; and they serve also, in the usual way, to guide the lower lifts of the holder. The upper lifts A4 A5 rise above the columns, and are controlled only by the ropes. In the arrangement shown, four control-ropes C^1 C^2 C^3 and C4 are arranged in pairs, in all respects similar. The one pair crosses the other pair at right angles over the top of the holder. D are guide-pulleys, supporting the ropes in this part of their course. Each rope may be traced from a point of attachment at the top of one of the columns B beneath a pulley F on the top of the lift A3, which is the uppermost of the lifts guided by the columns; thence up to the top of the holder, and across to the other side; then down under a pully F^1 on the lower part of the highest lift A5, and over a pulley G^1 on the top of the lift A4; thence the rope passes in a similar way over pulleys F^2 and G^2 on the lift A4 and A3 respectively. The rope has now again reached the lift A3, with which it first engaged; and from this point, it is led down to the ground-level at H, where it is made fast at the foot of the same column B. The other rope of the pair takes a precisely similar course, but passes in the opposite direction—starting from the top of the same column B at which the other rope terminates. This arrangement equalizes the friction and other conditions on the two sides of the holder.

Obtaining Cyanides from Illuminating and Heating Gas.—Foul's, W., of Glasgow. No. 9474; May 18, 1892.

According to this invention, the patentee proposes to pass the gas, after the ammonia has been removed from it, through, or in contact with, a solution of carbonate of potash or carbonate of soda, in which solution carbonate or oxide of iron is maintained in suspension. This may be effected by causing the gas, on its way from the ammonia scrubbers to the purifiers, to pass through the solution having the carbonate or oxide of iron in suspension; so that the gas itself constitutes the means whereby the carbonate or oxide of iron is maintained in suspension.

A convenient way of obtaining carbonate of iron for use in the process is to take 5 gallons of a solution of chloride of iron (containing about 1·5 lbs. of metallic iron per gallon), and add to it a solution in about 30 gallons of water and 15 lbs. of soda-ash (containing 98 per cent. of carbonate of sodium). A double decomposition takes place; and chloride of sodium and carbonate of iron are formed. The latter, being insoluble in water, precipitates; the supernatant liquid (consisting of a solution of chloride of sodium) being run off, and, if required, heated to obtain the salt by crystallization. The carbonate of iron thus obtained, together with a solution of 27 lbs. of soda-ash, made up to 40 gallons with water, are then introduced into an apparatus, wherein the mixture is subjected to agitation; while the gas deprived of its ammonia is brought into contact therewith. The gas, in passing through this apparatus, parts with the cyanide it contains—forming ferro-cyanide of soda or potash, as the case may be. If carbonate of potash be employed instead of soda to treat the carbonate of iron, 35 lbs. of carbonate of potash may be used, in place of the 27 lbs. of carbonate of soda.

Fig 1. *Fig. 2.*

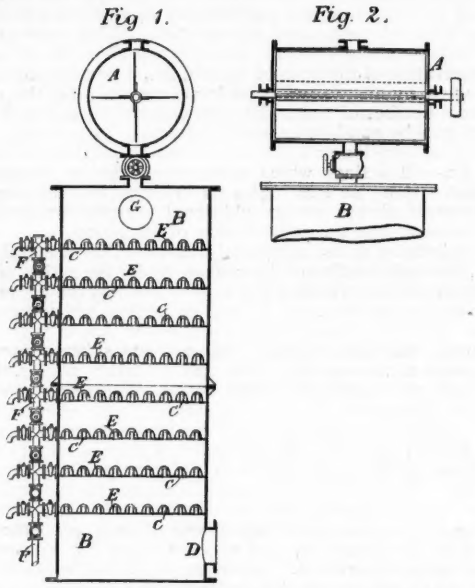


Fig. 1 is a sectional elevation, and fig. 2 is a section at right angles thereto (the latter only of the upper part) of apparatus adapted for the purpose.

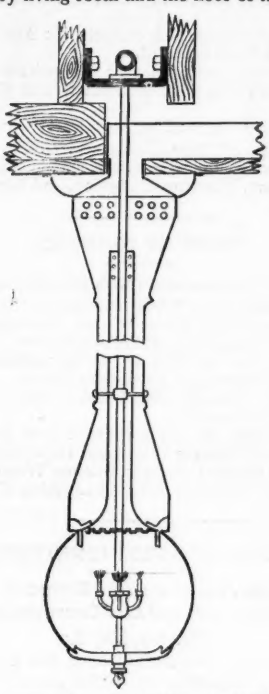
The mixture is poured by the top opening into the mixing vessel or stirrer, shown at A; and it is therein kept agitated by blades on a rotating-shaft. From thence the mixture is admitted (either in quantities intermittently or in a continuous small stream) through the valve X into the scrubber B, as required; descending from shelf to shelf by overflowing and passing down the pipes C. The gas is admitted at D from the ammonia scrubbers, and passes up through the pipes C. These are covered by hoods E, with openings at the bottom, which may be serrations with their points resting on the shelves, so that the gas is compelled to pass down into the mixture between the pipes C and hoods E, and up through the mixture from compartment to compartment of the scrubber. The gas thus keeps the liquid so agitated that the carbonate of iron is suspended therein; the gas eventually passing off by the outlet G. The gas is, during its passage through the scrubber, exposed to the mixture for a sufficient time to cause the cyanides to be removed therefrom; they being retained in the liquid (in the form of ferro-cyanides), which can be withdrawn from time to time for treatment—for example, for obtaining the cyanide in a commercially available form. There may be a pipe F with branches leading from each shelf, and with valves therein, so that any compartment may be shut off, or the liquid drawn off from either compartment, as desired.

Instead of the foregoing method, the compound of iron and soda or potash may be presented to the gas by the gas being exposed on large surfaces wetted with the mixture; the carbonate or oxide of iron being kept in suspension by mechanical agitation. An arrangement for the purpose would consist of brushes, with their lower parts revolving in the mixture, so as to continually agitate it from the bottom, and present freshly wetted surfaces to the gas passing through the upper part of the vessel containing the mixture and the brushes. The liquid drawn off from the scrubber may be evaporated to dryness by fire heat or otherwise (it can be done best, says the inventor, in an iron pan with a fire underneath it); and to the cake, which is the result of this process, water is afterwards added, to dissolve the soluble cyanide salts therein—the carbonaceous or other impurities depositing freely from the clear liquor, which it would not have done but for the previous evaporating process. The ferro-cyanides can be obtained in the crystalline form by slightly evaporating the liquor. The sludge which is removed from the vessel where the cyanides have been dissolved from the cake, may be treated for the recovery of any iron cyanides, or other matter of any value there may be in it.

Lighting and Ventilating Rooms.—Bray, G., of Leeds. No. 20; Jan. 2, 1893.

This invention relates to improvements in patents No. 3040 of 1891 and No. 743 of 1892. It has for its object: (1) A more secure suspen-

sion of the globe. (2) The staying of the globe at the top to prevent tilting. (3) An arrangement of the lower ends of the bottom cones in relation to each other, and to the top aperture of the globe, so as to prevent the escape of an undue quantity of hot products of combustion and air from the top of the globe. (4) Arrangements for the conduction of the hot products of combustion and air, which pass up the inner shaft, and of the comparatively cool air, which passes up the annular space and in at the apertures near the top of the outer shaft, and for lowering the temperature of the hot products of combustion and air, which pass up the central shaft, when the effluent products of combustion and air are required to pass horizontally—as between the ceiling of an ordinary living room and the floor of the room above.



As shown in the engraving, the better suspension of the globe is accomplished by a sleeve, screwed inside to secure it on the down rod, and fixed at any position by a set screw. This sleeve is turned up on the inside, to fit the boss of the holder; and, by preference, it is also formed with a collar at the top. The holder is placed on the sleeve against the collar; and at the bottom of the down rod is a knob, screwed inside. Between the collar on the sleeve and the knob, the holder and globe are free to revolve in one direction, without danger of unscrewing the knob from the down rod and letting down the globe; and in the opposite direction, without danger of the holder being screwed rigidly to the collar, whereby the globe might be broken by being tightened at the top against the guides or the cones.

The globe is stayed at the top, by securing a number of guides (four by preference) to the bottom of the inner and the outer cone—each having a projection which reaches below the bottom of the cones, and depends within the top rim of the globe, and prevents it from tilting.

The bottom of the inner cone projects below the bottom of the outer cone, and into the top of the globe. This keeps the top aperture of the globe practically closed round its top edge, although its top edge may be (as is frequently the case) materially uneven in level. By this arrangement, nearly all the hot products of combustion and air are passed up the inner shaft. The annular space between the inner and outer cones and shafts is thus a conduit for comparatively cool air, and the relatively slight quantity of hot products of combustion and air that escape between the top of the globe and the bottom of the inner cone.

Instead of continuing the inner shaft into, and throughout the horizontal part of the outer shaft, it is stopped about 4 inches above the vertical part of the outer shaft, which projects into the room, and closed at the top. There are a number of apertures of suitable size near the top end, through which the heated products of combustion and air issue into the outer shaft, and mix with the comparatively cool air that has ascended the annular space, and with that which has entered through the apertures near the top of the outer vertical shaft; and this mixture, to a large extent, comes in contact with the comparatively large and cool surface of the upper part of the vertical shaft. By this arrangement, the advantage is claimed to be secured that the elbow of the outer shaft does not become unduly and dangerously hot, as it would if the hot products of combustion and air were allowed to strike directly against it, without being mixed with the comparatively cool air that ascends the annular space, and with that which enters through the holes near the top of the vertical outer shaft; and this cooling is further aided by the mixture coming in contact with the upper part of the outer shaft. Also that the friction of the issuing products of combustion and air is greatly reduced in the horizontal portion of the shaft, as there is only one surface instead of three, as hitherto.

Fatal Gas Explosion at Mansfield.—An alarming fire, caused by an explosion of gas, occurred recently on the premises of Mr. J. H. Blake, ironmonger, of Mansfield, and has unfortunately been attended with fatal consequences. There were five persons in the cellar at the time of the outbreak; and, in making their escape, all of them were badly burnt. Mr. Lloyd, a valuer, who was engaged in taking stock for Mr. Blake, was conveyed to a hotel, where he died last Thursday.

CORRESPONDENCE.

[We are not responsible for opinions expressed by correspondents.]

Mr. Linton's Report on the "Young Process."

SIR,—Will you permit me to say, in regard to the article in this week's JOURNAL, on "Water Gas up to Date," that the report I was requested to make to the Committee of the Edinburgh and Leith Gas Commissioners, was in the hands of the Committee on the 8th of April? It would have been "curious," indeed, if I had been able to include in the report information as to Professor Lewes's patent for the manufacture of carburetted hydrogen, which first appeared in your issue of the 11th of April. As a matter of fact, I was aware that Professor Lewes was working at the subject, and of the lines on which he was working; but I could hardly have referred, in my report, to what I knew of the matter.

The other references in the article are evidently due to not having seen the report, but only so much of it as—without my concurrence or knowledge—appeared in the JOURNAL of the previous week. I do not in the least blame your Edinburgh correspondent for getting information where he can; but the report has as yet been before a Committee of the Commissioners only, and was, therefore, not proper to be published until submitted to the Commissioners themselves. It appears, however, that a member of the Commission considers it consistent with his duty to communicate to the Press information and documents which, being before a Committee only, are usually considered to be private and confidential—with the result that the Commissioners as a body are left to get information as to their affairs after it has been for some time made public in the newspapers.

Leith, May 5, 1893. FREDERICK T. C. LINTON.

The Alexander-Paterson Oil-Gas Process.

SIR,—In the "Notes from Scotland" in your issue of the 25th ult., your correspondent, in referring to the article on the "Alexander-Paterson Process for the Manufacture of Oil Gas," which appeared in the JOURNAL for the 18th ult., remarks that no information was given as to the permanency of the gas produced by the process, or as to whether the plant is capable of dealing with oils of higher specific gravity than ·865.

In reply, allow me to say that, so far back as April 17, 1886, Professor W. Ivison Macadam, of Edinburgh, in a lengthened report on this oil gas, refers to its permanency in the following terms: "I further made a series of trials to show the keeping quality of the gas, and find that it is quite as permanent as ordinary coal gas, and that therefore it may be stored over water without serious loss through condensation. These experiments have been continued over some three months, side by side with similar experiments on ordinary 28-candle cannel gas; and the results are highly satisfactory." Again, on April 2, 1887, he reported: "The gas is of very high illuminating power, and may be kept for long periods without deterioration." Subsequent experience has fully confirmed the opinion thus expressed with respect to the permanency of oil gas made by this process. As regards oil available for the process, one of its merits is that any kind of paraffin or petroleum is suitable, from a burning oil of ·804, to Russian residuum of ·910 specific gravity; the use of a particular oil being simply a question of price or convenience.

Allow me to take this opportunity of calling attention to a statement contained in Mr. Linton's report to the Edinburgh and Leith Gas Commissioners, given in your issue for the 25th ult., which is calculated, no doubt unintentionally, to create a wrong impression. In referring to the output of oil gas by the Alexander-Paterson process, he says: "The quantity of gas made per retort was stated to be 2000 cubic feet per 24 hours;" while in another process, with a larger retort, which he names, "about five times this quantity [10,000 cubic feet] is made per 24 hours; so that the Alexander-Paterson process would require, relatively, a very large amount of plant for the manufacture of a given quantity of gas." Mr. Linton has inadvertently omitted to state that the output of 2000 cubic feet per retort per 24 hours was of 150-*candle power gas*. Had it been of the same enriching power—viz., 90 candles—as the other process referred to, the output would have been 3200 cubic feet in 24 hours.

I may add that, so far as I am aware, in proportion to the space occupied, the Alexander-Paterson plant is capable of making a larger quantity of oil gas in a given time than any other known process.

R. PATERSON, Manager,
Patent Paraffin Gas Lighting Company, Ltd.

Glasgow, May 5, 1893.

The Crystal Palace Gas Bill.

SIR,—We shall be much obliged if, in your next issue, you will correct a few errors which have crept into your leading article of the 2nd inst., in reference to the Bill of the Crystal Palace Gas Company.

Our clients, the Beckenham Local Board, were strongly opposed to the Bill on the questions of capital, illuminating power, standard price and purity, and also desired to have a testing-station within their own district; and the Croydon Corporation conducted their case in a friendly manner with them.

If you will compare the Bill as brought in with the last print, after having been amended in Committee, you will see that, upon all the points mentioned, with the exception of purity, our clients obtained all they desired:—

(1) The additional capital was cut down from £200,000 to £100,000.
(2) A standard of illuminating power of 15 candles, with Dibdin's 10-candle pentane standard, instead of the 14 candles advocated by the witnesses previous to Mr. Livesey.
(3) The standard price to range from 2s. 10d. to 3s. 2d., in lieu of 3s. 6d. This neutral zone was suggested by the opposition.
(4) A testing-station to be provided in Beckenham for the Local Authorities outside the Metropolis.

All these terms were arranged during the progress of the Company's

case; and therefore it was unnecessary for the opponents to present their case.

You are perfectly correct in stating that this result is due to Mr. Livesey's strong "desire to be fair in the matter;" but had the opponents of the Bill been unreasonable in their demands, the case would not probably have ended so satisfactorily. He discussed matters in dispute with the opponents, except in reference to the London County Council or the Gas Referees having any jurisdiction in the district of the Company, to which our clients and the Croydon Corporation were equally averse.

STEVENSON AND BURSTAL.

38, *Parliament Street, S.W., May* 5, 1893.

Mechanical Conveyors for Gas-Works.

SIR,—On pp. 640, 641, and 642 of the JOURNAL I see a description of Little's patent chain tray conveyor. As regards fig. 1, it is the same as is known in America as M'Casslin's conveyor, which has been in successful operation at the Milwaukee Gaslight Company's works for the last two years. Fig. 2 is an old "chestnut," and was in use at Milwaukee about five years ago, and proved absolutely useless, for the reason shown in the paper I read before the American Gaslight Association last October (see JOURNAL for Nov. 22, 1892, p. 904). Where the patent comes in, I do not know. Figs. 3 and 4 are what is known as the "scraper conveyor;" and it has been used here for many years. The appliance shown in figs. 1 and 2 cannot be used for hot coke, as, owing to the way in which it is arranged, the wheels would get hot. Fig. 3 has too much stretch in the wire rope; and figs. 3 and 4, too much wear and tear on the sliding surface. The whole thing looks like a very crude affair. They have all been tried here exactly in the way they are shown; and none of them, as they are, amount to anything for hot coke. Figs. 1 and 2 are very well for cold coke; but they will never do for hot coke. The wheels should be absolutely done away with where there is any tendency for them to become hot; and they should be placed in such a way that they cannot heat.

FRED. BREDEL.

Milwaukee (Wis.), April 24, 1893.

Oldbury Gas Undertaking.—At the meeting of the Oldbury Local Board last Friday, the Chairman of the Gas Committee (Mr. J. W. Wilson) presented the report of the above undertaking for the year ended Dec. 31, 1892. It showed that the total amount of loans outstanding was £71,745. The expenditure amounted to £76,212, of which £64 was spent last year. The sales of gas realized £9168; and the residual products, £2526. The total receipts were £11,901. The aggregate expenditure was £7816; leaving £4085 as the gross profit. After making allowances for interest, and instalments for repayment of loans, there remained a balance of £558; being the net profit for the year. Mr. Wilson, in moving the adoption of the report, remarked that, during the twelve months under review, satisfactory progress had been made in the Gas Department. There was an increase of 3 million cubic feet in the sales of gas, or about 6 per cent., compared with the previous year. The price of coal was high; but the Committee hoped to do better in the current year. On the total amount realized by the sales of gas, there was an increase of £600 compared with 1891; but there was a decrease in the amount obtained for the residuals. The cost of manufacture showed a slight increase; but as regarded the loans, they had never been on a more satisfactory basis since the works were established The report was approved.

The Charge of Embezzlement against the Collector of the Kendal Gas and Water Company.—Our readers may remember that in October last year the collector of the Kendal Gas and Water Company (Marcellus Thompson) was charged at the Westmoreland Sessions with having embezzled various sums of money, and was sentenced to three years' imprisonment. In the course of the trial, the Chairman of the Company (Mr. W. D. Crewdson) gave evidence of a confession made to him by the prisoner; and it transpired that he had said it would be better for Marcellus if he would make a clean breast of it. The prisoner's Counsel held that, under these circumstances, the confession was not voluntary, and ought not to have been received. The matter came a short time ago before the Court for the Consideration of Crown Cases Reserved, on a case stated by the acting Chairman of the Justices of the Peace for Westmoreland; and it was sent back to be re-stated. On the 29th ult., it was again brought up. The Court consisted of the Lord Chief Justice, and Justices Hawkins, Cave, Day, and Wills; and the question to be decided by them was whether or not the evidence of the confession had been properly received. Their Lordships unanimously decided that it had not, and that the conviction must be set aside; and a written judgment to this effect was delivered by Mr. Justice Cave.

Proposed Purchase of the Workingham Gas-Works by the Town Council.—A special meeting of the Wokingham Town Council was recently held, to consider a report of the Lighting Sub-Committee containing a record of their proceedings on the question of acquiring the local gas-works. In November last, the Town Clerk was instructed to write to the Company to ascertain whether they were willing to negotiate with a view to selling their property. The reply of the Directors was in the affirmative; and, in the course of further correspondence, they suggested an upset price of £8160 for the working plant, buildings, retorts, gasholders, pipes, mains, meters, and goodwill. They reserved for the Company all money belonging to them, and stated that they would discharge all liabilities, and deliver the works up as a going concern, free of debt. The price named was higher than the Sub-Committee anticipated; and they asked the Directors if they were prepared to make an amended offer. To this the Directors replied that the offer was based upon a careful consideration of the value of the property; and their opinion had been confirmed by valuers of experience. Ultimately the parties agreed, subject to the approval of the Council and the shareholders, that the works should be transferred at a valuation to be made in the usual way; the Sub-Committee undertaking to purchase on the terms arranged. The report was adopted.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following progress was made with Bills last week:—

Bills read the first time and referred to the Examiners: Electric Lighting Provisional Orders Bill (No. 2); Gas Provisional Orders Confirmation Bill, relating to Newent Gas, Portishead Gas, Sheffield Gas, and Sligo Gas; Gas Provisional Orders Confirmation Bill (No. 2), relating to Bromyard Gas, Llanfairfechan and Aber Gas, Otley Gas, and Swindon Gas; Stirling Water Bill.

Bills read a second time and committed: Altrincham Gas Bill; Brighton and Hove Gas Bill.

Bills reported, with amendments: Altrincham Gas Bill; Crystal Palace District Gas Bill; Runcorn Water Bill; Weaver Navigation Bill.

Bill read the third time and passed: Ilkley Local Board Bill.

The West Hampshire Water Bill was referred to a Select Committee, consisting of Earl Belmore (Chairman), the Marquis of Hertford, Viscount Powerscourt, Viscount Hampden, and Lord Truro; to meet on Monday, May 8.

HOUSE OF COMMONS.

The following progress was made with Bills last week:—

Bills read the first time: Water Provisional Orders Bill, relating to Hoylake and West Kirby Water, Pocklington Water, Poole Water, and South-West Suburban Water; Water Provisional Orders Bill (No. 2), relating to Llandrindod Wells Water, Maidenhead Water, and Newington Water.

Bills reported: Barnoldswick Local Board Bill; Staines and Egham District Gas Bill.

Bills read the third time and passed: New Swindon Gas Bill; Rathmines and Rathgar Water and Improvement Bill; Staines and Egham District Gas Bill; Stirling Water Bill.

Bill withdrawn: Brighton Electric Lighting Bill.

HOUSE OF LORDS COMMITTEE.

(*Before Lord* SANDFORD, *Chairman; Earl* KINGSTON, *Lord* CHURCHILL, *Lord* DE VESCI, *and Lord* CHEYLESMORE.)

Monday, May 1.

CRYSTAL PALACE DISTRICT GAS BILL.

On this Bill, the proceedings on which were reported last week, coming before the Committee to-day for the settlement of clauses,

Mr. POPE, on behalf of the London County Council, claimed that, in addition to the terms already agreed upon, a clause should be inserted recognizing that body as the testing authority for the part of the Company's district situated within the County of London.

Mr. BALFOUR BROWNE, for the promoters, protested against the re-opening of the case; stating that it was understood that the terms agreed upon on the previous Thursday were satisfactory to all parties. If they had known, he said, that the County Council were not satisfied, they would have preferred to go on with the case instead of coming to a settlement.

Mr. POPE remarked that the only way in which the Council became interested in the matter was that they were the controlling gas-testing authority for the County of London; and certain portions of Lambeth, Lewisham, Camberwell, and other districts served by the Company were within the area of the county. The Council were satisfied with the terms agreed upon, and thought, as a matter of principle, the Bill should go forward; but the only way in which he wished to re-open the case was this—that the clause giving a seven days' average in respect of the standard of purity with regard to sulphur was made applicable to illuminating power.

Mr. BALFOUR BROWNE said this was not the intention; and it should be remedied if it was so.

Mr. POPE observed that, as regarded the standard of sulphur impurity, the Bill would unquestionably affect the conditions under which the London Gas Companies, under the authority of the County Council, carried on their business. Seeing that the Local Authorities had consented to take an average of seven days' testing, he did not feel at liberty to re-open this question on behalf of the Council; but he wished explicitly and emphatically to say that, in keeping silence in the discussion, they must not be taken to assent to this principle in regard to other districts or other places, and that the Bill must not be regarded as a precedent in any application which might hereafter be made for a modification of the powers under which the Council acted within their own district. He wanted to make this statement as emphatically and explicitly as he could, in order to keep alive the right of the Council to maintain the three days' and not the seven days' average in their district. He further contended that the Council ought to be the testing authority to enforce the provisions with regard to illuminating power and purity within their area. In the interests of the public—though he agreed that it was not in those of the Company—a vigilant authority was the one which should, if possible, be constituted for the purpose of seeing that the requirements of the Act of Parliament were complied with. The Local Authorities, especially that of Lambeth, had neither the machinery nor the means, nor the amount of interest necessary to constitute an efficient authority for the purpose. The greater part of Lambeth was protected, as regards its gas supply, by the Council as testing authority. The proper method of ascertaining whether or not the requirements of the Act of Parliament were complied with was not to put it into the hands of an authority which could not incur the expense, and which had not the machinery, the power, or the interest to enforce the purity of the gas as against the Company. After what had taken place, he thought he ought not to ask for an extension of the authority of the

Council beyond the County of London; but where the supply came within their area, he asked their Lordships to place in the hands of a vigilant and competent authority, having the necessary machinery, the enforcement of the statute which they were about to make. He therefore proposed to include the London County Council among the authorities who were to have access to the testing-place, and power to enforce penalties so far as the area of London was concerned.

Mr. BALFOUR BROWNE said the matter Mr. Pope had raised was one which the Company were prepared to contest; and it was an exceedingly hard thing that it should be re-opened after the settlement which had been arrived at. At the present time, the County Council had nothing to do with the Company; and if the Bill were withdrawn, they would have no power whatever in the Crystal Palace district. They were expressly shut out by the Metropolis Gas Act of 1860.

Mr. POPE: That is 33 years ago.

Mr. BALFOUR BROWNE said it had not been repealed, and therefore it still remained on the Statute Book. All the parishes had now full power, under the Act, to come to the testing-place and test the gas; but that "vigilant authority," the London County Council, had no power whatever, though they now asked for one which Parliament in 1860 said it should not have. He objected to this entirely; and, seeing that terms had been agreed upon, he hoped their Lordships would not re-open the matter, but keep all the parties to their bargain.

The CHAIRMAN said the Committee could not entertain the claim put forward by the County Council.

Later in the day, agreed clauses, carrying out the arrangement entered into on the previous Thursday, were brought up and passed; and the Chairman was directed to report the Bill, as amended, to the House. This was done last Thursday.

LEGAL INTELLIGENCE.

NEWCASTLE (STAFFS.) COUNTY COURT.—Tuesday, May 2.

(*Before His Honour Judge* JORDAN.)

Vickers and Wife v. North Staffordshire Water-Works Company.

The Liability of Water Companies for Injuries Caused by Leakage.

This was an action tried at a previous sitting of the Court, in which the plaintiffs sought to recover damages against the defendants for causing the female plaintiff to break her wrist.

Mr. SPROSTON appeared for the plaintiffs; Mr. BODDAM represented the defendants.

The facts of the case were that on the 3rd of January last, the female plaintiff, Mrs. Vickers, went to make a call at the house of a man named Proctor, in Abbey Street, Silverdale. There had been a frost for some time previously; and, owing to an escape of water from somewhere, there had formed in front of the house a sheet of ice, upon which Mrs. Vickers slipped and broke her wrist. Vickers alleged that as the defendants' water-main was carried under the highway in front of the house, there was a leakage in consequence of a defective joint. There was a joint close to the spot where Mrs. Vickers fell; and, upon the ground being opened, there was found to be a leakage owing to the packing of the joint having become loosened. The evidence for the plaintiffs was that the leakage was a considerable one; and as the pressure on the main was admittedly from 75 to 80 lbs. per square inch, and as the pipes were laid in clay, the water could not get away by percolation, and had consequently risen to the surface, where it had become frozen, and so caused the road to be dangerous. The defendants called a considerable quantity of evidence to show that the leakage was only very small, and that the accumulated water had descended from an old field drain which discharged itself about 5 yards higher up the road on an incline descending to Proctor's house.

His HONOUR, in the course of his judgment, said: I have come to the conclusion that the leakage from the defendants' main and the water discharged from the brick drain both contributed substantially to the accumulation of water which became transformed into ice in front of Proctor's house. It was not contended that the leakage was caused by *vis major* or the act of God, but it was claimed for the defendants that, even if their leakage had brought about the mischief, they had not been guilty of any personal negligence, and had received no notice of the leakage before the accident occurred. I find as a fact that they had no notice of a leakage before the accident; and I am of opinion that the defendants were not guilty of personal negligence. The question then arises: Are the defendants liable to the plaintiffs for the injury caused by the leakage of the water, which, as a natural consequence, became frozen into ice? It has been decided by the highest Court in the realm, in the celebrated case of *Fletcher v. Rylands* (35 L.J., Ex. 154), that a company are liable, if an escape of water takes place without negligence, for injury caused by a latent defect which ordinary prudence and skill could not detect. The principle laid down by Lord Blackburn was this: "The person who, for his own purpose, brings on his land, and collects and keeps there, anything which is likely to do mischief if it escapes, must keep it in at his peril; and if he does not do so, he is *primâ facie* answerable for all the damage which is the natural consequence of its escape. He can excuse himself by showing that the escape was owing to the plaintiff's default, or that it was the consequence of *vis major* or the act of God." If this is so when a man brings water on to his own land, *a fortiori* it is so when he brings water on to the land of another, or on to a public highway. Here it was not contended that the escape was caused by *vis major* or the act of God, or by the plaintiff's default. There is, however, a further principle of law which must be applied in this case, and it is that, where two or more persons commit a wrongful act which causes injury to a third, they are each severally liable to be sued for the whole damage caused. Or, as it is said in the books, every party to a tort is liable to be sued for the whole damage done, no matter how numerous the wrong-doers may be. For the above reasons, I am of opinion that the defendants are liable for the whole damage caused in this case, and that there must be a verdict for the plaintiffs for 20 guineas and costs.

MISCELLANEOUS NEWS.

IMPERIAL CONTINENTAL GAS ASSOCIATION.

The Half-Yearly General Meeting of the proprietors of this Association was held last Tuesday, at the City Terminus Hotel, Cannon Street—Sir JULIAN GOLDSMID, Bart., M.P., in the chair.

The SECRETARY (Mr. R. S. Gardiner) read the notice calling the meeting, and also the report of the Directors, as follows:—

The present half-yearly ordinary general meeting of the proprietors has been convened in conformity with the Association's Acts of Parliament for the purpose of receiving a report from the Directors upon the affairs of the Company, and of declaring a dividend for the half year ended the 31st of December last.

The following summary shows the results of the Association's operations during that period: The quantity of gas made in the half year ended Dec. 31 last was 4356 million cubic feet; and the quantity made in the corresponding half year of 1891 was 4261 millions—being an increase of 95 millions, or at the rate of 2·22 per cent. The total number of lights on Dec. 31 last amounted to 2,054,553; there being at that date 142,913 consumers on the books of the Association. At the close of the corresponding half year of 1891, the number of lights was 1,975,039, which gives an increase of 79,514, or at the rate of 4·02 per cent. The entire length of mains on Dec. 31 last was 1667 miles; and the length of mains laid on Dec. 31, 1891, was 1605—an increase of 62.

These figures show that the Association's business continues to grow; but, owing to the continued depreciation in the value of coke and tar, the profit earned is but slightly in excess of the corresponding half year.

The gasholder in course of erection at the Weissensee works near Berlin was completed. In order to utilize the plant at Brussels to better advantage, the Directors decided to lay a main connecting the two works which serve that station.

The Directors have to report that they have obtained a prolongation of the concession for the supply of gas to the City of Antwerp until the year 1927.

The Directors have sold land for which there was no further use at Rotterdam and Marseilles, and have also been able to dispose of the former offices in Clements Lane, London.

The Directors have to record, with sincere regret, the retirement from the Board, and subsequent death, of Mr. Henry M'Lauchlan Backler, who had been a Director of the Association for 9 years. The vacancy thus created on the Board has been filled by the election of Robert Tindall, Esq.

The Directors desire in conclusion to draw the attention of the proprietors to the accounts for the half year ended the 31st of December last. These have been duly audited; and from them the Directors have, in accordance with the provisions of the Companies' Clauses Consolidation Act, prepared a scheme showing the profit of the Association for the half year, and the portion thereof applicable to the purposes of dividend, which they recommend now to be declared—viz., a dividend of 5 per cent. for the half year ended the 31st of December last, and a bonus of 1 per cent., both payable, free of income-tax, on and after the 1st day of June next.

The Directors who go out of office by rotation are: Robert Tindall, Esq., Sir Julian Goldsmid, Bart., M.P., Francis Bassett, Esq. These gentlemen are eligible for re-election, and offer themselves accordingly. The Auditor who goes out of office by rotation is Joseph Sebag Montefiore, Esq., who is eligible for re-election, and offers himself accordingly.

The CHAIRMAN said that he had to refer, in the first place, to the events recorded in the Directors' report. There had been a small increase in the profit over the corresponding period of the previous year, which was principally owing to the somewhat lower price of coal; but, as he had often explained at their meetings, when they considered the advantage they gained by the reduction in the price of coal, they had to put on the other side the loss they made by the reduction in the selling price of the coke produced, because, if they gave less for coal, they were quite certain to obtain less for coke. Sometimes, too, the fall in the price of coke was more rapid than the gain derived from the reduction in the price of coal. That was obvious, because coke was always sold more or less from hand to mouth, for the daily consumption of the poorer inhabitants, to a great extent, in every important town; and therefore the price was regulated by the daily requirements. With reference to coal, however, they, like other great gas companies, had to make contracts beforehand, for the period of which they were bound by the price at which the contract was made. He noticed not long ago that The Gaslight and Coke Company had entered into a contract which involved a very serious loss, owing to the rapid fall in coal within four or five months after they made the contract. But, of course, the Directors of that great Company were bound to provide the necessary coal for the working of the concern; and they could not always foretell what was in the womb of time. They were obliged to accept the inevitable; and therefore they had to take the contract at the price which could be obtained at the time they entered into it. He pointed this out to show the shareholders that, though the Directors might exercise their best judgment in the making of the coal contracts, they might be wrong, the same as other Directors. The practice on the Continent was to make very long contracts—for three, four, or five years; but in their own case, they generally made them for one year only. It was almost impossible to make them for a shorter period than that; but, within the currency of that year, they were subject to the fluctuations which must occur in the market. Sometimes these had been greatly to the Company's advantage; while, at other times, they had been to their disadvantage. On the whole, however, the policy they had pursued for many years had proved to be in the best interests of the shareholders. There were one or two other circumstances to which he desired to call attention. They were liable, like every inhabitant of Continental towns, to the taxation of those towns, and to the Imperial taxation; and Imperial taxation on the Continent, especially in Germany, had of late greatly increased. Over this, of course, those present, who were all honest taxpayers in England, would understand that the Directors had no control. Anyone might just as well say: "I object to the additional 1d. in the income-tax which the Chancellor of the Exchequer has just imposed." All the answer one would get in such a case would be: "Object you may, but pay you must;" and he feared that this exactly applied to the Association in their position of taxpayers on the Continent. This was an additional item of expenditure; but it was the only special one to which he desired to refer. An event that had occurred in the course

of last year was of great interest to the Association—not from the point of view of payment. It was that their Chief Engineer (Mr. L. G. Drory), who was formerly also their Inspecting Engineer—a post now so well filled by Mr. Corbet Woodall—had completed 50 years of service with them. They thought it right to record this event on the part of the Board; and he was sure the proprietors would all take an interest in the long service of one who had been a faithful employée of the Association. He did not know that there was anything else in the report to which he need allude. It recorded the ordinary hard work of a very busy Company and a very busy Board. He did not think that any of the shareholders could be aware how much work was involved by the attendance to their interests. After referring to the report, it had always been his practice to mention one or two features of interest which had occurred since the 1st of January—the date at which the report closed. First of all he would remind them that, when they took the contract at Amsterdam, they applied to Parliament for power to issue £1,000,000 of debenture stock. They at that time did not obtain this power; they were only granted by Lord Redesdale, who was then Chairman of Committees of the House of Lords, the power to issue £500,000. This was done; and the shareholders took up the whole of it. The amount was issued by debentures at 4 per cent.; and he supposed they represented one of the best securities ever offered in the City of London. As, however, they were not able to obtain power to issue £1,000,000, the full power they asked for, they had found themselves hampered, in consequence of increasing capital expenditure; and they had therefore thought it right this year to bring in a Bill asking for authority to extend their borrowing powers up to one-fourth of the ordinary capital, which was the power possessed by every English Gas Company. This would give them the right to issue in all £950,000, including what had been issued already. He was happy to say that Lord Morley, the present Chairman of Committees, upon explanations he had been able to give to his Lordship, readily passed their Bill, which had become an Act of Parliament, as it had received the Royal Assent. The consequence was that they had given the proprietors notice of a special meeting, which would be held after the present one, in order to exercise those powers to the extent of £350,000. Why they arrived at this sum, he would explain when he came to the special meeting; but he had thought it right thus to prepare the way by reminding them of the history of the last few years. He had always told them (and he desired to repeat it) a fact which it was well to bear in mind when they were dealing with Continental gas investments. In some cases they might have a freehold, as the English gas companies had. But those were few and far between; and in most instances they depended upon concessions which were granted either by Imperial, Royal, or Municipal authorities. Of course, these concessions were terminable; and, when they were terminating, there were always great difficulties in endeavouring to renew them. During the half year they had renewed the concession in the important City of Antwerp; but this had involved negotiations spreading over a period of more than two, if not three years. Therefore the proprietors would understand what trouble, labour, and anxiety such negotiations involved; and, of course, they might not always have as satisfactory an issue as those undertaken in connection with Antwerp. They had also in many cases to make concessions to the municipalities which English gas companies were not obliged to make, because the latter possessed a freehold. He had mentioned this matter to them before; and he referred to it again, because, as he had often told them, it was the black side of the picture of investments in Continental gas companies. He ought to say at the same time that it had been for many years past the practice of the Directors to look out for other opportunities of extending the field of work of the Association, because, if they did lose any concession, an extension of their field would make it good. Some of the old shareholders would remember that, before he was a Director of the Company (as he had been now for 25 years, before, in fact, anyone present was a Director, except Mr. Newton), they lost several important stations—for instance, Marseilles, Toulouse, Bordeaux, &c. The result of this, of course, was that for the time the business of the Association was considerably reduced; and consequently they had to depend on extended work in the other towns they lighted, or on a new field of operations. They thought it right, therefore, in view of the possibility of losing any concession from time to time, to look wherever possible for any extension in other fields. This was a policy which he thought was wise; and he was quite sure that prudent shareholders would approve of it. This was one of the reasons why they had to issue more capital now, because it was upon this principle that they had been acting for a considerable time. He concluded by moving the adoption of the report.

Mr. NEWTON seconded the motion, which was carried unanimously.

The CHAIRMAN then proposed the payment of the dividend and bonus mentioned in the report.

Mr. PALMER seconded the resolution, which was agreed to.

The CHAIRMAN said that, as stated in the report, the Directors had elected Mr. Tindall to fill the vacancy caused by the retirement of the late Mr. Backler. They selected Mr. Tindall because they believed that, owing to the scientific knowledge and general ability of that gentleman, he would be able to render them good service; and he thought he might say that their expectations would be fully realized. He then proposed his re-election.

Mr. NEWTON seconded the motion, which was adopted. He afterwards proposed the re-election of Sir Julian Goldsmid as a Director; and referred to his ability as Chairman of the Board—ability which had become well known to the proprietors.

Mr. FRANCIS BASSETT seconded the resolution, which was adopted.

On the motion of the CHAIRMAN, seconded by Mr. PIGOU, Mr. Bassett was also re-elected to his seat at the Board.

Mr. J. DREW afterwards proposed, and Mr. HORNCASTLE seconded, the re-election, as Auditor, of Mr. Joseph Sebag Montefiore, which was unanimously agreed to.

The SECRETARY then read the notice calling an extraordinary meeting of the proprietors, to authorize the borrowing of a sum of money on mortgage, debentures, or debenture stock, in accordance with the provisions of the Association's Act of 1893.

The CHAIRMAN said he thought they would all agree that, if they could raise money at 3½ or 4 per cent., as they did on the last occasion, and could invest it so as to pay 5 or 6 per cent., it was good economy to borrow it in this way rather than to issue new stock, which required to earn a larger amount of profit, in order to maintain the same dividend as they were paying on the ordinary stock. This principle was cordially and unanimously approved by the shareholders, both when they permitted the Directors on a former occasion to ask Parliament for power to borrow £1,000,000, and also recently, when they gave them leave to ask Parliament to extend the borrowing powers, which had been limited by Lord Redesdale in the way he had already described. The principle having been cordially approved of, he did not think it was necessary for him to do more than say that the Directors entirely concurred in the view which he had expressed. They would ask him why the Board had fixed upon a sum of £350,000, whereas he had mentioned to them before that they had been somewhat hampered on capital account, owing to the large outlay that had been incurred in the proprietors' interest. The Directors had thought it right to buy concessions of small towns adjoining some of the great cities they lighted, because they thought that, if they did not do so from time to time, competitors, even for the larger stations, might hereafter arise. Upon this principle, the Directors had purchased two places near Berlin—Weissensee and Lichterfelde—with the approval of the shareholders in the last few years. They had had the opportunity of purchasing three or four years ago a concession for lighting a town in the south of France—Saintes—which gave good hope of future profit. Then, they had worked for some years on the principle of taking an interest where they could in gas companies which were more or less their rivals, because they thought that, if they were shareholders in such concerns, their interests would be more consulted than if they were opponents only. On this principle, they had purchased shares in various Gas Companies; and in the same way they had now upon the *tapis* proposals to purchase two or three concessions which they thought of value, and which would require the expenditure of something like £100,000. In addition to this, as the proprietors were aware, they had spent between £70,000 and £80,000 upon the new offices in Austin Friars. He explained to them, when they approved of this, that their former offices were too small for their requirements, and that they found it necessary, for sanitary and other reasons, to remove to larger premises. The offices they possessed in Austin Friars fully represented the amount they had cost them; and he believed that, if they had to go into liquidation even to-morrow, they would realize the sum they had expended upon them. Meantime the business was carried on properly there, with every accommodation for the staff. In various ways, they had, in the last five years, spent, or were expecting to spend, about £450,000. They had provided from other sources—from profits realized, and not divided—£100,000; and therefore it remained for them to provide, for the purposes he had described and the purchases they were contemplating, the sum of £350,000. If this amount was issued at 3½ or 4 per cent., it would not add a very large amount to the sum they had to pay before they declared a dividend; and they considered it was the most economical way of supplying the capital required. He therefore had no hesitation in proposing—"That the Directors be and are hereby authorized, in accordance with the provisions of the Imperial Continental Gas Association's Act of 1893, to borrow the sum of £350,000, on such terms and in such manner as they think fit." He submitted this to the proprietors convinced that it would receive their unanimous approval.

Mr. NEWTON seconded the motion.

Mr. L. JACOBS asked the amount received by the Association for the old offices.

The CHAIRMAN: A little more than £22,000.

Mr. J. A. BROWN thought that between £70,000 and £80,000 was a large sum to pay for the new offices.

The CHAIRMAN replied that the property was freehold, and that the sum included furnishing and everything else. In answer to other questions, he added that the Directors' idea was that they would issue a circular very shortly to explain the terms, which they had been carefully considering, on which they would propose to offer the new capital; and they would state, as they did before, that applications from shareholders would receive the first consideration. He thought it would be wiser for him not to mention the exact terms on which they proposed to issue the new capital. They had been consulting capable financial advisers, and having the advice of their colleague, Mr. Bassett; and they would do their best in the interests of the Association. He then put the resolution, which was carried *nem. con.*

On the motion of Mr. COOPER, seconded by Mr. G. BARRETT, a vote of thanks was passed to the Chairman and Directors.

The CHAIRMAN acknowledged the compliment; and, in reply to a question, added that the reason why the Directors, within a quarter of an hour of deciding upon the dividend had always sent the news to the papers, was in order that the public and the shareholders generally might at once be informed on the matter. The notice convening the meeting did not go into details, but merely said that a report would be read to them and a dividend proposed. This was the form which had always been adopted by them.

A vote of thanks to the staff, both at home and abroad, was afterwards passed; and the proceedings then terminated.

The Cost of the Blackburn Gas Explosion and the Price of Gas.—The Gas Committee reported to the Blackburn Town Council last Thursday that they had resolved to increase the price of gas for all purposes by 3d. per 1000 cubic feet (subject to discount as heretofore) from July 1 next. The price to ordinary consumers is at present 3s. 4d. Being asked to explain the reason for this resolution, Alderman Thompson stated that the increase was due to the gas explosion, which caused the destruction of the Crown Hotel and the adjoining shop, and the loss of five lives, and had cost the town £14,000. The only way in which this could be met was by increasing the price of gas; but he believed it would have been advanced in any case to some extent. Mr. Hamer asked if the policy of abolishing the meter-rents had had anything to do with the increase. Alderman W. Thompson answered in the affirmative, and added that a sillier thing was never decided upon.

BOMBAY GAS COMPANY, LIMITED.

The Ordinary Meeting of this Company was held last Thursday, at the London Offices, 6, Draper's Gardens, Throgmorton Avenue, E.C.—Mr. R. DAVIDSON in the chair.

The SECRETARY (Mr. J. H. Perrins) read the notice convening the meeting; and the report and accounts for the year ending Dec. 31 last, which were summarized in the JOURNAL for the 25th ult., were taken as read.

The CHAIRMAN said that, in submitting the report on the proceedings of 1892, he regretted very much that it was scarcely so favourable as they were in the habit of presenting. The shareholders would see that on the credit side of the profit and loss account, there was a decrease in the gas and meter rental of £1541, of which £637 was in the public lighting, and £912 in the private lighting. On the public lighting, there was a discount which, under their agreement, they had to give to the Municipality, when a certain number of lights were taken; and there was also another arrangement, by which the Municipality could take lamps for part of a month instead of the whole month, and the difference amounted to 800 hours per annum. With regard to the decrease in the private lighting, trade in India had not been so good lately as previously; and a good deal of economy was now being practised. The low value of the rupee no doubt had also some effect. Their Manager had sent them a list of the number of consumers and the consumption in November last, which showed that, in that month alone, there was a decrease of 500,000 cubic feet. However, on the year, they had 70 new consumers, owing principally to the Welsbach burner, which had jumped into favour in Bombay. This burner gave a very excellent light, and consumed a great deal less gas; and some establishments, where hitherto other illuminants had been used, were now adopting them. The item of coke, tar, fittings, &c., was better on this occasion by £417; and he might say that the fitting business had been very active, owing to the demand for the new burner. On the debit side of the account, coal was £753 less, although they had consumed 820 tons more; the cost last year having been lower by 3s. per ton than in 1891. In wages there was a decided increase, due to there having been more stokers and coke wheelers, and higher wages, which their Manager (Mr. Louis Penny) assured them were necessary, in order to avoid a strike. The matter, however, was an important one, and was receiving the best attention of the Directors and the Manager; and they hoped to bring the item back to its normal figure. Regarding the other items, considerable additions, as he mentioned last year, were being made to the plant, both in the way of extensions and renewals. The major portion of the cost thus incurred had been charged to capital; but some of the items had been placed against profit and loss account, under the head of trade charges. Then there had been £227 less for passage money; and £203 less for salaries. There were no passages last year; and the commission which the Manager at one time received had been given up. Respecting exchange, in 1892 it was 1s. 3⅞d. per rupee; while in the preceding year, it was 1s. 4 3/32d.—showing that it was rather more than 2 per cent. better in 1891. It had since dropped to 1s. 2⅞d., or a fall of 6 per cent. as compared with last year on the amount of money they had home from Bombay—not on the net profits. At the last meeting, he stated that negotiations were going on with the Municipality for a renewal of the contract for public lighting. These negotiations had been protracted; and, so far, they had got the contract extended for one year from the 1st of July next. The Municipality invited tenders for lighting by oil and electricity; but it was difficult to believe that, in a place like Bombay, they would go back to oil. Electricity had not made any great headway in Bombay; and it did not seem to give satisfaction. Every effort had been made by the Directors to get a new contract for a term of years. The position now was that it had been renewed for twelve months, to enable the Municipality to test the Welsbach burner for public lighting; and, if it succeeded, there was no doubt the Company would obtain a new contract. He believed this was the first time for 20 years, the Directors had had to propose a reduced dividend. They had been very reluctant to drop from the 7½ per cent. they had paid the shareholders for so many years; but he did not see that they had any alternative or option in the matter. He concluded by moving the adoption of the report and accounts, and the declaration of a dividend of 3 per cent., free of income-tax; making, with the interim payment, 6½ per cent. for the year.

Mr. C. GANDON seconded the motion.

Mr. ADAMS said he had been a shareholder in the Company for something like 20 years; and, as the Chairman had said, this was the first time they had come down to 6½ per cent. dividend; but he was not at all surprised it was so. It seemed to him to be a very unsatisfactory thing that a body of men of business should sit down without being able to help themselves with regard to this diminution of dividend, which was brought about by the fall in the exchange. Some time ago he wrote to the Chairman suggesting a plan which he then thought (and did so still) would get the Company out of this difficulty; but no doubt the letter was "shelved." His idea was that they should adopt a sliding scale of charges in Bombay. For instance, supposing they were now charging 6 rupees for gas, and, with the exchange at 1s. 3d., this enabled them to pay a dividend of 7½ per cent., he suggested that, if the exchange went down to 1s. 2d., they should charge the consumers more; if it went down to 1s., still more—say, 6½ or 7 rupees as the case might be. Then if the exchange went up, they would give the consumers the benefit of it—for example, supposing it rose to 1s. 4d., they could lower the price of gas to 5½ rupees. The London Gas Companies had a sliding scale; and it was also possible that in Bombay they might charge more or less in the manner he had described. As the Chairman had said, theirs was not the only Company concerned in the fall in exchange. There was the Singapore, the Hong Kong, and probably the Calcutta Company, and many other trading concerns were similarly affected. The Directors of their own and these other Companies might, he thought, put their heads together, and see whether some plan could not be devised by which they would get out of this trouble.

Mr. MACKAY wished the last speaker had gone a step farther. He had mentioned other gas companies, but had not stated what they had done, in order to meet the difficulty in regard to exchange.

Mr. ADAMS said he did not know. His suggestion was that the Directors should confer together, and see whether they could not hit upon some plan.

Mr. CUFF considered there was a good deal of difficulty about the point which had been raised. If the shareholders were being paid, on the average, something under 5 per cent., instead of above, a step might possibly be taken in the matter; but he was afraid their customers in Bombay would take it with very bad grace indeed, if they went to them and asked them to pay more in order that the Company might maintain a dividend of 7 or 8 per cent. Personally, he thought there was a good deal more hope in what the Chairman had stated with reference to the wages. He said that the increase in that item (which was an increase on an increase) in the past year accounted for half of the diminution in the dividend. This was an important matter; and the Chairman held out the hope that the wages would be brought down. He wanted to ask one question in connection with the subject of exchange. They brought forward in the last accounts the large sum of £20,000; and the past year had been charged with £18,000—the balance being something under £7000. He had no doubt the accounts were perfectly correct, and the past year only ought to be charged with the £18,000; but he should like to know how it happened that the large balance was brought into last year's accounts.

Mr. WILLIAMS inquired if the loss of the public lighting would be likely to affect the interests of the Company, and also how the reserve fund was invested.

The CHAIRMAN, in replying, said that the suggestion as to the sliding scale would be very well if they were working at similar rates to the London Companies, whose charge for gas was from 2s. 9d. to 3s. per 1000 cubic feet. In Bombay the price was 6 rupees, or, even at the present rate of exchange, 8s.; and the competition between electricity—and more particularly oil, was so fierce, and the latter was so cheap, that any attempt to raise the price would simply mean a loss of customers. [Mr. ADAMS: I also advocated putting the price down when possible.] There was no prospect of their being able to do that. If they wished to recoup themselves for the fall in the exchange, the price would have to be raised to 7 or 8 rupees. Regarding the question as to exchange, the large amount at exchange equalization account for 1891 was absolutely necessary, because they then had an unusual amount of money in Bombay. But at the end of last year they had only £12,000 there; and the amount to the credit of the fund was ample for covering that and more. The reserve fund at present was between £15,000 and £16,000; and of that they had invested in deposits £8000. They had bills on hand not yet due, and available assets for the whole amount of the reserve fund. The interest obtained was about 4 per cent.; but it varied. If they lost the public lighting, it would have a serious effect.

The motion was then unanimously carried.

The retiring Directors (Mr. Frederic Lane Linging and Major W. F. Gordon), and the Auditors (Messrs. E. A. Flinders and Magnus Ohren) were re-elected.

Mr. ADAMS having proposed a vote of thanks to the Chairman and Directors,

Mr. SUART seconded it; and, in the course of a few remarks, he called attention to an article which recently appeared in the JOURNAL dealing with the question of oil gas, in which the cost of a given amount of oil gas was put down at about £2, and of an equal amount of coal gas at £9. [Mr. GANDON: That was cannel coal.] In India they had very valuable oil-fields which would be available for the manufacture of gas; and there were means of making oil gas cheaper where oil was abundant and heavy, as it contained residuals which some of the lighter oils did not.

The motion was unanimously passed.

On the proposition of Mr. BLUNDELL, a vote of thanks was also accorded to the staff at home and abroad; and the proceedings then terminated.

Sales of Shares.—Last Wednesday, Messrs. Pendered and Son sold at the Hind Hotel, Wellingborough, 500 "C" (£10) shares in the Wellingborough Gas Company. They were 7 per cent. shares, issued pursuant to the Company's Act of 1879, and were knocked down at the following prices: 10 at £16 15s. each, £167 10s.; 415 at £16 17s. 6d. each, £7003 2s. 6d.; and 75 at £17 each, £1275. The total amount realized by the sale was £8445 12s. 6d.——At a local sale by auction last Tuesday, six £30 new shares in the *Yarmouth Gas Company* were disposed of at £50 each.

Bolton Corporation Gas Accounts.—At last Wednesday's meeting of the Bolton Town Council, the Gas Committee reported that their receipts during the past financial year had been £134,989, which was £1502 less than in the preceding twelve months. It was pointed ou by Mr. Lythgoe that the Committee were this year paying £2475 to the reserve fund account, and £16,351 to the district fund; while last year the corresponding items were £4445 and £18,000. He wished to have the falling off explained. Alderman Broughton, in reply, pointed out that, whereas the Committee obtained £10,000 for tar in 1890, they only received £3600 this year. The report was adopted.

Southampton Corporation Water-Works.—The annual report of the Water Engineer of the Southampton Corporation (Mr. W. Matthews, M.Inst.C.E.) has been issued. It states that the total quantity of water pumped in 1892 was 894,960,000 gallons, as compared with 830,500,000 gallons in 1891. The amount sold by meter, supplied to Otterbourne, and used at works was 130,161,000 gallons, and consumed for domestic purposes, 764,799,000 gallons; the figures for 1891 being 136,322,000 and 694,178,000 gallons. The consumption per head per day for domestic purposes was: 1892, 31¾ gallons; 1891, 27¾ gallons. The consumption during the year was over 60 millions in excess of that for 1891, due chiefly to the long drought in the first half of the year. The report concludes with a table giving the cost of working: The Mansfield expenses were £143; Otterbourne, £2268; softening, £655; distribution, £1390; sanitary supply, £73; management, £755—total, £5286. Deducting the cost of water sold by meter, £668, makes the net cost of the domestic and sanitary supply, £4618; the cost per head of population (65,800) being 1s. 4¾d.

PARIS GAS COMPANY.

The Report and Accounts for the Year 1892.

The following is an abstract translation of the report of the Directors of the Paris Gas Company for the past year (presented at the recent annual general meeting of shareholders), with the accounts for this period in our usual condensed form.

The report commences with some particulars in regard to the consumption of gas. In the twelve months ending Dec. 31 last, there were sent from the works 308,900,930 cubic metres, or about 10,907,700,000 cubic feet, of gas; being 3,028,620 cubic metres, or 106,923,000 cubic feet, less than was consumed in the preceding year. The day consumption, however, not only did not decrease, but really rose in the last months of 1892. It amounted to 84,479,870 cubic metres, or about 2,982,000,000 cubic feet, of gas, or 27·35 per cent. of the total, as compared with 26·45 per cent. in 1891. This result is attributable to the extended use of rising mains for the supply of the occupants of the "flats" of buildings—a special feature of the Company's business—to the increased employment of gas-stoves for domestic purposes, and to fresh measures which have been adopted in order to encourage the consumption of gas in private apartments. The receipts from the sale of gas last year amounted to 79,540,685 frs. (£3,181,628), as compared with 79,606,950 frs. (£3,184,278) in the year 1891, and 79,069,443 frs. (£3,062,778) in 1890. Of the first-named amount, 72,809,165 frs. came from the city, and 7,731,520 frs. from the surrounding districts. The number of consumers on Dec. 31 last was 251,813; whereas on the corresponding date in 1891 it was only 242,339—an increase of 9474, as compared with 9329 in the preceding twelve months. The number of public lamps in use at the close of the past year was 79,525, of which 68,593 were employed in lighting the city. In this total are included 2216 recuperative burners, to which must be added 2324 similar appliances in use by private consumers—making altogether 4540 high-power burners, corresponding to 31,000 jets of the ordinary type. The number of rising mains fixed during 1892 was 2155, of which 393 were for new houses. The Directors last year decided, with the view of encouraging the use of gas by the occupants of apartments at less than 500 frs. annual rental, to exempt them from payment for the use of meters and fittings; and the step was attended with results so satisfactory, that measures are being taken to extend the system. The number of consumers taking a supply of gas from rising mains on Dec. 31 last was 126,320; exceeding by 7531 those at the corresponding date in 1891. The proportion of these consumers to the total number was 50·16 per cent., as compared with 49·02 per cent. in the preceding year. Of the entire number of consumers, 139,338 made use of the stoves lent gratuitously by the Company; being an increase of 14,035 on the figure at the close of 1891. With regard to the works, no extensions were made during the year. The distributing plant, however, was increased by 14,008 metres in Paris, and 14,889 metres in the suburbs. This brought up the total length of mains at the close of the year to 2,298,492 metres, or about 1425 miles.

Turning to the financial part of the report, we find that a net sum of 4,430,110 frs. (£177,204) was expended on capital account, of which 1,437,651 frs. were for the station at Le Landy, 1,558,934 frs. for rising mains, and 1,305,343 frs. for service-pipes and meters. The capital account stood as follows on Dec. 31, 1892:—

	Francs.		Sterling.
Amount expended to Dec. 31, 1891	286,426,289	..	£11,457,052
Do. do. during 1892	4,430,110	..	177,204
	290,856,399	..	£11,634,256
To meet which there has been raised—			
By shares. 84,000,000 frs.			
By bonds 221,185,689 „			
	305,185,689	..	12,207,427
Showing an unexpended balance of	14,329,290	..	£573,171

The following is the working account for the ast year:—

Expenditure.

	Francs.		Sterling.
Value of gas in store on Jan. 1, 1892	53,760	..	£2,150
Manufacture of gas—			
Coals carbonized	22,651,979	..	906,079
Coke and tar for heating purposes	4,569,576	..	182,783
Salaries and wages	4,83c,007	..	193,200
Maintenance of works and plant	1,795,893	..	71,836
Incidental expenses of carbonization	1,710,192	..	68,408
Purifying materials	502,120	..	20,085
Distribution—			
Salaries of engineers and officers	1,832,334	..	73,294
Repairs, &c., of mains and services	1,284,331	..	51,373
Miscellaneous expenses, stamps, &c.	373,081	..	14,923
General management—			
Directors and Executive Committee	300,000	..	12,000
Salaries	1,147,305	..	45,892
Office and other expenses	369,856	..	14,794
Service, accidents, relief, &c.	323,455	..	12,938
Law and other charges	30,503	..	1,220
Bad debts	8,432	..	337
Rents and insurances	310,665	..	12,427
Interest on loans	8,365,873	..	334,635
Loan redemption fund	8,632,550	..	345,302
Share redemption fund	2,620,000	..	104,800
Cost of experiments, &c.	186,606	..	7,464
Sundry works	72,741	..	2,910
Pension and provident funds	310,852	..	12,434
Municipal charges—			
Tax of 2 c. per cub. met. of gas sold	5,376,209	..	215,048
Rent of subsoil occupied by mains, &c.	200,000	..	8,000
Lighting, extinguishing, and maintenance of public lamps (less amount paid by Municipality)	1,214,364	..	48,575
State charges—			
Official gas testing, stamps, &c.	1,077,154	..	43,086
Total expenditure	70,149,838	..	£2,805,993

Revenue.

	Francs.		Sterling.
Value of gas in store on Dec. 31, 1892	61,360	..	£2,454
Sale of gas	79,540,685	..	3,181,628
Residual products—			
Coke	17,329,802	..	693,192
Tar	2,360,009	..	94,400
Ammoniacal liquor	1,305,551	..	52,222
Rental of meters and fittings on hire	3,058,382	..	122,335
Fire-bricks, &c.	67,627	..	2,705
Interest and discount	1,105,139	..	44,206
Total revenue	104,828,555	..	£4,193,142
Deduct expenditure	70,149,838	..	2,805,993
Balance, profit for 1892	34,678,717	..	£1,387,149
Deduct balance of 1891 liquidation, and to meet outstanding claims	278,717	..	11,149
Balance available for distribution	34,400,000	..	£1,376,000
Deduct for share dividend	11,200,000	..	448,000
Balance, divisible equally between the Company and the Municipality	23,200,000	..	£928,000

The total amount available for distribution among the shareholders is, therefore, as follows:—

	Francs.		Sterling.
Dividend as above	11,200,000	..	£448,000
Half of divisible balance	11,600,000	..	464,000
Portion of annuity (now compounded) payable by Municipality	50,000	..	2,000
Balance of undivided profits	156,752	..	6,270
Total	23,006,752	..	£920,270
Deduct 1 fr. per share for reserve fund	336,000	..	13,440
Balance	22,670,752	..	£906,830
Deduct interim dividend of 12 frs. 50 c. per share paid in October last	2,567,450	..	102,698
Balance available for final dividend	20,103,302	..	£804,132

The balance allowed of a further payment of 59 frs. 50 c. per share; making in all 72 frs. per share of 250 frs., or at the rate of 28·8 per cent., and leaving 111,302 frs. (£4452) to be carried forward. The dividend is lower by 2 frs. 50c. than that for the preceding year. The difference is explained by a slight increase in the cost of coal, a reduction in the returns for coke, an advance in the value of labour, and the additional charges occasioned by the last loan.

With regard to residuals, the sale of coke produced 363,803 frs. less last year than in 1891; the figures for tar and ammoniacal liquor being about the same as before. The consumption of gas for motive power continues to increase. Last year there were put up 191 motors of all makers, representing 772-horse power; whereas in 1891 only 34, equal to about 222-horse power, were erected. The quantity of gas consumed by these motors is reckoned at 4,200,000 cubic metres, or about 400,000 cubic metres more than in 1891. Fewer appliances for heating by coke were sold last year—960, as compared with 1120. The success which has attended the establishment of show-rooms for all kinds of gas appliances in three of the principal streets of the city has led the Directors to open another on the south side of the Seine. During the five winter months (Oct. 1, 1892, to March 1, 1893), upwards of 70,000 persons visited these exhibitions; the result being something like 2500 orders. Encouraged by these results, the Directors have commenced showing in their coke-stove warehouse in the Rue de Rivoli, as well as in their district offices, any gas appliances entrusted to them. Being brought in this way under the immediate notice of the gas consumers in the different parts of the city, they are more likely to become better known; and their popularization will necessarily contribute to maintain gas in the place it occupies for lighting and heating, whether for domestic or industrial purposes. Stoves of various sizes have been placed in a number of important establishments—Government offices, railway termini, hospitals, &c.

A section of the report is devoted, as usual, to the provident, pension and other funds connected with the Company, of which full particulars are furnished. Then comes a chapter on the subject of the price of gas, which, in view of its importance at the present juncture, we translate in full. It is as follows: At our last meeting, we announced that the question of reducing the price of gas, which had for a long time occupied attention without result, had been again brought forward in the Municipal Council in the early part of June, 1890; and that the Administration had been commissioned to seek, in association with the Directors, some means of satisfying the demands of the consumers. We added that the Council had already rejected two provisional agreements based on the prolongation of the concession for 25 years, and that we had availed ourselves of a third combination upon which it might be possible soon to come to an understanding. The negotiations in connection with this matter resulted, after a short delay, in a convention which was signed by the Prefect of the Seine and the Company's representatives on April 23, 1892. It was to be hoped that this convention, the bases of which had been settled by the Administration in conjunction with a Committee of the Municipality, would be well received by the Council. We regret, however, to state that, owing to disagreement on a question of the interpretation of the Treaty of 1870, the Council (who were much divided on the subject of the new conditions to be introduced into the convention) abruptly broke off negotiations on the 23rd of November last, and rejected the propositions submitted to them. They even called upon the Administration, on the 27th of the following month, to submit to them a project for the purchase by the City of the privilege the Company possess under the Treaty of Feb. 7, 1870, which has still 13 years to run. Although we do not propose to ask your vote on the subject of an agreement which is now abandoned, we think it desirable to enter into some details, in order to make you acquainted with the difficulties which the question of the reduction in the price of gas presents, the means proposed for effecting this reduction, and the circumstances which have brought about the rupture of the negotiations. Ever since the year 1879, complaints have been made that the price of gas was higher in Paris than in many

other large towns in France and abroad; and from this fact the conclusion has been drawn that the Company are making extraordinary profits. This is a misunderstanding, which it is necessary to dispel. In fact, when it is considered, on the one hand, that the gas employed for lighting the streets as well as the municipal, departmental, and military establishments, is only paid for at the rate of 15c. instead of 30c. per cubic metre, and, on the other hand, that, notably in 1892, the Company paid into the coffers of the City, as rent for the use of the subsoil, *octroi* dues, share of profits, &c., the sum of 18,390,573 frs., it is clear that the actual average price received has not been more than 20·25 c. The Company, therefore, do not, on their own account, get more per cubic metre of gas sold than most of the other gas companies in the large towns of France and other countries; and if the consumers in Paris pay more for gas than those in Vienna, Berlin, &c., it is because the Municipal Authorities draw from them, through the medium of the Company, a number of dues, the total of which amounts to nearly *one-third of the price charged for gas supplied to private consumers*. This is the real cause of the high price of gas in Paris, and the reason for the difficulty which attends any reduction therein. Those who put upon the Company the responsibility for this state of things deceive themselves, and ignore the efforts which the Directors have always made to remedy it. The various provisional agreements which have been considered during the past three years have had for their object the reduction of the price of gas from 30c. to 25c. per cubic metre for lighting and heating, and from 30c. to 20c. per cubic metre for motive power. This would ensure for the consumers an annual saving of from 10 to 12 million francs. The idea which appeared at first most reasonable for securing this result, and for compensating for the diminution in the receipts that would follow, was to reduce the capital charges by extending over a greater number of years the period for the redemption of the shares and bonds, and, for this purpose, to prolong the concession of the Company by 25 years. This resolution has formed the basis of two provisional Treaties, dated Oct. 24, 1890, and June 18, 1891; but the Municipal Council has refused to admit the principle of a prolongation of the concession, and demanded the consideration of a new combination, based on the suspension of the redemption of the bonds till Jan. 1, 1906. This contrivance would allow the loss resulting from the reduction in the price of gas to fall nearly every year on the City and the Company. We were desirous of respecting the wishes of the consumers; and therefore we did not hesitate to participate in the views of the City, and accept a new scheme of arrangement, which, as shown above, was definitely signed on April 23, 1892. This scheme was not put on the *agenda* of the Council till six months afterwards; and it has shared the fate of its predecessors. The disagreement arose in an unforeseen manner, on a point raised by the Administration as to the interpretation of the Treaty of 1870. It became a question of ascertaining how the liquidation of the moveable and fixed assets of the Company would be effected on the expiration of the concession. The scheme of arrangement of April 23, 1892, provided that, at the end of 1905, the City should acquire the moveable and immoveable property of the Company, on paying them the value thereof in accordance with the Treaty; and that, until the amount could be settled, the Company should continue to exercise their functions temporarily, on the conditions in force at the close of the concession. In the course of a conference that took place on Nov. 5, 1892, the Administration manifested a desire to reconsider this stipulation. They demanded that, in case of any difficulty arising as to the amount to come to the Company on the division, we should admit their right to assume the working of the concern on Dec. 31, 1905, on payment of interest at the rate of 4 per cent. on the value of our part of the assets, calculated provisionally on the figures of the balance-sheet of 1905, without specifying anything as to the definite settlement, the bases and the date of which remained undetermined. The City demanded, moreover, that the mains should become their property at the end of the concession, without any payment whatever being made for them. Acting under advice, we have not thought fit to assent to these modifications, and to enter into engagements which would deprive us of an indispensable guarantee for the protection of the rights which we possess under our concession. Our assets represent, in fact, the security for our preference shares; and we cannot part with them except on being indemnified for the portion to which the holders of those shares have a right. This difference of opinion on a question of which the solution was not urgent, since we have yet thirteen years wherein to study and settle it, did not appear to be of a nature to cause a rupture in the long and tedious negotiations, or the rejection of the convention of April 23, 1892. It seemed to us to be more judicious to adjourn till some future time the discussion of so serious a subject. This is what we have put before the Administration, at the same time expressing ourselves always ready to accept the convention of April 23, and to maintain the concessions agreed upon in the course of the negotiations which followed the signing of that convention. We regret that the Municipality have not seen matters in the same light. In rejecting the convention, they have evidently availed themselves of their rights. But, on our part, we consider we have done our duty in declining to accept the modifications proposed; and we do not admit that we can be held responsible for the maintenance of the *status quo*. In conclusion, gentlemen, there is nothing in the position of our Company to cause you any uneasiness. Your rights are protected by regular agreements. Your concession of 50 years terminates on Dec. 31, 1905; and it is impossible to curtail it without your consent. We shall continue, in case of need, as we have always done, to examine with the greatest care any proposals which may be submitted to us; and you may rely upon it that we shall neglect nothing to protect and safeguard your interests.

Extension of Electric Lighting at Morecambe.—In consequence of the growth of their business, the Morecambe Electric Lighting Company have resolved to increase their generating plant, so as to supply an extra 1500 16-candle power lamps. Additions are being made to the "Dowson" gas-making apparatus; and a large dynamo of the "Preece" type is being put in. The dynamo will be driven by a gas-engine, built specially for the work by Messrs. Crossley Bros.

WEST MIDDLESEX WATER-WORKS COMPANY.

The Half-Yearly General Meeting of this Company was held last Tuesday, at the Office, Marylebone Road—Sir W. H. Wyatt in the chair.

The Secretary (Mr. F. H. Wybroo) read the notice calling the meeting; and the report of the Directors was taken as read. He afterwards read the report of the Auditors, which stated that the revenue for the half year ended Lady-day last had been £121,884; showing an increase of £3176 over that of the corresponding period of the previous year. The balance to the credit of the dividend and interest account was £152,175.

The Chairman, in moving the adoption of the reports and accounts, stated that, during the time he had had the honour of presiding over their general meetings, there had never been an occasion on which there was less for him to tell them—in fact, he had nothing to mention, except what was in the report. The only thing fresh was that, since the report was drawn up—in which they stated that the Royal Commission had held their last public meeting, they had heard that that body were going to hold some more sittings, though what they were going to do he did not know. All the Company's works and stations were in excellent order. He did not think anything had been left undone that could have been done to keep them up to the highest point of perfection; and the water had been for some time excellent. Of course, he need not tell the shareholders that the continual sittings of the Royal Commission, of House of Commons Committees, and of other bodies were very trying and expensive. He thought that for some years past they had cost this Company alone more than £2000 a year; but the Directors could not help this. As far as could be judged from the evidence, he did not think that anything that had occurred before the Royal Commission had been unsatisfactory; indeed, he thought that all the evidence had been strongly in favour of the Water Companies. Still, they must not form any judgment as to what the report of the Royal Commission would be, or as to when it would be issued. He did not believe they would get it before Christmas, though he was told that it would be presented in July. Until then they were, to a certain extent, "hung up." They would like to go to Parliament to get some more money for reservoirs; but it would be unwise to do so until something definite was decided as to the future. All that they could do was to watch over the interests of the proprietors, which he thought they had done heretofore most attentively; and they would continue to do so.

Mr. J. Pomeroy seconded the motion, which was at once unanimously adopted.

The Chairman then proposed the declaration of a dividend on the consolidated stock for the half year ended March 31 last at the rate of 10 per cent. per annum, less income-tax.

Mr. Pomeroy seconded the proposition, which was agreed to.

Resolutions were afterwards passed re-electing the retiring Directors (Sir W. H. Wyatt, Mr. A. Ward, Mr. E. Boulnois, M.P., and Mr. J. Miles) and the Auditors.

Mr. R. Hack proposed, and Mr. Howson seconded, a vote of thanks to the Chairman and Directors, which was carried unanimously.

The Chairman, in reply, stated that, although there had been very little to tell them, the past half year had not been uneventful; for the Directors had had a good deal to do in watching over the interests of the Company, and seeing that they were protected. He could assure the shareholders that, so long as they retained the proprietors' confidence, the Directors would do everything in their power to promote the interests of the Company. They were never unmindful that it was also their duty, which they performed fairly and honestly, to study the interests of the consumers, for they regarded themselves now very much as trustees of the consumers, as well as of the proprietors. Practically, the consumers now derived all the benefit of the careful attention that was paid to the Company's affairs; for the proprietors received their fixed dividend, and they were never likely to get any more. They studied the consumers in every possible way; and it was their intention to continue to do so.

The proceedings then terminated.

Vienna Water Supply.—The water supply of Vienna will shortly be augmented to the extent of something like 7 million gallons daily, owing to the discovery of another mountain spring close to the present works in the Schneeberg district. As the city usually suffers from want of water every winter, as well as in the height of summer, the new source will afford great relief to the inhabitants.

The Manchester Corporation Gas Committee and Tender Letting.—The Manchester Gas Committee came in for a good deal of criticism at the meeting of the City Council on Wednesday last. The minutes which they presented stated that they had accepted the tender of a Mr. Nuttall for the erection of a gasholder and tank for £30,897 8s. Mr. Hampson called attention to the fact that this was £1982 6s. 8d. more than the tender of another competent firm (Messrs. J. Wilson and Co.); and he moved an amendment to the effect that the minutes be confirmed, except the portion relating to this item, and that this matter be referred back for reconsideration. The motion having been seconded, Alderman Clay rose to a point of order; and objected to matters being re-introduced which had been decided some time ago. Mr. Hampson, however, held that, in view of the heavy rates, it was necessary they should not throw away £2000. Mr. Southern supported the amendment; and then Alderman Higginbottom said the Committee accepted Mr. Nuttall's tender because they had a better acquaintance with his ability in this kind of work than with that of the other firm. Alderman Leech, Mr. Hoy, Sir J. J. Harwood, and Mr. Worthington supported the amendment; while Mr. Tunstall thought that they had treated Mr. Nuttall in anything but a fair manner in regard to other matters. Mr. Brooks, Chairman of the Gas Committee, remarked that he had no objection personally to take the matter back. For this work 20 tenders were sent in, ranging from £52,940 to £28,915; and Mr. Nuttall's was nearly £4000 below the average. The amendment was carried.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

By the constitution of the Edinburgh Town Council, a resolution of the Council does not become final until it has been three times affirmed by the councillors—once when adopted, and twice on the minutes. Readers of the JOURNAL will remember that, in the days of the gas transfer, this arrangement gave opportunity to the few who opposed to keep the matter before the public in a more thorough way than would have been otherwise possible. The same thing is happening with the resolution which the Council adopted on the 18th ult., to retain the working of the electric lighting Provisional Order in their own hands. The minutes came up for their first reading on Tuesday; and there was a long discussion upon the whole subject again. Unlike the case of the gas transfer, where the majority kept together, in this case it has fallen, and the minority has risen. On April 18, the figures were: For, 20; against 10. This time they were: For, 19; against, 16. There were six members of Council who did not record their votes on Tuesday; and when it is brought up again, as it is to be at the second reading of the minutes, there is a possibility that the resolution may be defeated. The sense of the community is undoubtedly against the proposal that the Corporation should themselves work the undertaking. This has been exemplified already, by the fact of a public meeting of ratepayers having been convened by the representatives of the Calton Ward, at which a resolution disapproving of the action of the Town Council was carried. Two of the representatives of the ward were in the majority in the division in the Town Council. One of them said he certainly would vote next time as he had done; and the other said he was going home to think about it. The chief argument used by the ratepayers was that it was unwise to saddle the whole community with a heavy burden, while the benefit was to be only for a few. The Merchants' Association also had the subject before them on Wednesday night; and they re-affirmed their resolution, that it would be inadvisable for the Corporation to undertake the lighting. As showing how some people are influenced in the matter, and how little they understand it, the bugbear which some of them saw ahead was that, if a Company were to get hold of the undertaking, they might compel the Corporation to take electricity from them for street lighting. Was ever such nonsense heard? The Corporation are not bound to light the streets by electricity, though they undertake the Order themselves. Even if they did that, the Cleaning and Lighting Committee would require to come to terms with the Electric Lighting Committee, as to the supply to be required and the price to be paid for it. In the case of a company, this could be made a matter of agreement. At the Town Council meeting, the discussion was a much more sensible one than it was on the previous occasion. Apparently the Councillors are reading up the subject, which is a good thing, because the more they inquire into it the less likely are they to be led into mistakes.

Two notable statements were made in the course of the discussion. The first was by the Lord Provost, to the effect that "if the citizens desired electric light they could get it cheaper from the Corporation than from a company." This idea is dominated by the notion that, unless the companies who wish to get the Order transferred to them saw their way to make a profit out of it, they would not be so anxious to get it. Now, there are more ways than one of making money out of a company. One of these is the supply of fittings. The Corporation have no power in this respect; and if they undertook that work, they would do so without statutory powers. Consumers of electricity would therefore have to call in outside tradesmen to wire and fit up their houses. A company could do all that work, and the probability is that intending consumers would employ the company from whom they were to get their supply to do it. There would at once be a very large source of revenue which a company would have, and which the Corporation would not have. The mere charge for the supply of current is what the Corporation are evidently regarding; but a consumer would, at the end of the year, have something else to look at, in the account rendered to him. Take, in the case of the Corporation, a consumer who put 20 lamps of 16-candle power on circuit. According to Professor Kennedy, the Corporation Consulting Engineer, the charge for current for these would amount to £17 a year. In addition to that the Corporation would get a little more (possibly other £2 or so) for hire of meter; but that is all. If a company had the undertaking in hand, they might charge only 15s. per lamp for current, which would work out at £15, or, with meter added, £17. But if the cost of wiring and fitting were added—say at 35s. per lamp, which I believe has been estimated as a likely amount—the consumers' account to a company would be, for the first year, £52; and in succeeding years there would always be something coming in to the company for repairs and renewals. As all the property in any given area would not be wired at one time, there would, from year to year, be a considerable revenue to a company from that source, out of which they could pay dividend. Of course, it is not to be supposed that under the Corporation the consumers would escape these charges for wiring and fitting. They would have to pay them to independent tradesmen; and the cost to the consumer would most likely be higher in that case. This is a phase which the Corporation seem to overlook when they attribute the desire of the companies to get their hands in, to a wish simply to get hold of a monopoly, in order that they might bleed the community whenever a transfer to the Corporation was proposed.

The other statement was by Mr. Kinloch Anderson. Mr. Kinloch Anderson is the Convener of the Works Committee of the Gas Commission; and, as such, he very opportunely, and in a manner for which he deserves the highest commendation, stood up and exposed a fallacy which was uttered by Mr. Auldjo Jamieson, to the effect that the Corporation had mismanaged the gas affairs of the city. Mr. Anderson pointed out that, since the Corporation took over the gas-works, they had given the public the benefit of from £8000 to £9000 a year by the abolition of meter-rents, and of about £4000 in the decreased charge for public lighting; and they had been obliged to raise the wages of their workmen by from £7000 to £8000 a year. These sums amounted to about £20,000. Besides that, the Gas Commissioners had spent about £30,000 out of revenue in the improvement of the works. They had also laid aside in sinking funds in five years £42,000; and they managed their business at a decreased expenditure of £900 a year, as compared with the Companies. The explanation should allay for ever the reiterated statements that the Corporation do not manage the gas undertakings for the benefit of the community. It is a pity it was not given sooner; but "better late than never."

There has been going on this week, in the columns of the *Edinburgh Evening Dispatch*, a correspondence on the subject of oil gas, with reference to the Peebles process, in which all the writers, with the exception of Mr. A. Bell, jun., of Peebles, who replied to them, have taken up a position antagonistic to the process. Such statements have been made as that a smell of oil has been felt when oil gas has been consumed. That is sufficient to set down the whole of the objecting correspondents as being persons who do not know what they are writing about. They are apparently writing of other processes, in which oil vapours are allowed to get away. Those who know the Peebles system and its results are aware that such is an impossibility. Scotchmen will understand the simile, when I say that it is as impossible to find oil depositing in the pipes or fittings from gas made by the Peebles process, as it would be to find barley being deposited at the bottom of a bottle of whiskey. I am certain that everyone who has seen the plant will bear me out in that; and if further proof were needed, it will be furnished at Peebles, as it has been to all others who have gone there to see the system at work. No one has yet gone there and come away sceptical. Quite recently, the Manager of a large gas-works went prejudiced against it, and prepared to show it up; but he returned home resolved to recommend its adoption. Some of the writers of these letters are, however, not above the suspicion of being interested in other processes, which may account for their hostility.

The working year of the Dundee Gas Commission closed on Sunday last; and at the monthly meeting of the Commission on Wednesday, Mr. Mitchell, the Convener of the Finance Committee, was able to report that during the year the quantity of coal carbonized amounted to 50,223 tons, as against 51,387 tons for 1891-2—a decrease of 1164 tons. The quantity of gas delivered had been 502,954,000 cubic feet, compared with 504,778,000 last year—a decrease of 1,824,000 feet. This was accounted for by the fact that, last year being Leap Year, there was an extra day's consumption. The gas per ton had been 10,021 cubic feet—21 feet above the estimate—which was very creditable to Mr. J. M'Crae, the Manager. He was certain that when the accounts were balanced this year they would turn out very satisfactory. Last year, at this time, the large increase of over 34 million cubic feet upon the preceding year was reported. The Commissioners last June raised the price of gas 1d. per 1000 cubic feet, making it 3s. 9d.; and this increase, with the lower price of coal, is expected to bring out a satisfactory surplus.

North Berwick is the only place in Scotland that I know of, where active steps are being taken to transfer the gas undertaking from a Company to the Corporation. That such a movement should be in existence there at the present time, derives interest from the fact that Mr. Brodie, who may be said to be the author of the Burghs Police Act that comes into force this month, is the Provost of the burgh. It is evident that a gentleman in his position must be thoroughly conversant with the advantages as well as the disadvantages of the Corporation owning the gas supply; and it may be assumed he has convinced himself that the former outweigh the latter. This week the subject of the transfer was brought before the Town Council by a letter from the Secretary to the Gas Company, asking the Commissioners to appoint an arbiter for the town. In commenting on this letter, Provost Brodie complained of the want of courtesy shown by the Gas Company to the Corporation; and he went on to say that he believed the Corporation would be able to take 1s. off the price of gas, and thereby to save a large amount to the inhabitants. Mr. F. T. C. Linton, Engineer of the Leith Gas-Works, was appointed to represent the town in the arbitration.

From Broughty Ferry, where Mr. R. B. H. Thomson was a week ago appointed Gas Manager, it is reported that the Gas Committee have been empowered to purchase 2000 tons of coal similar to that from which last year they had a yield of gas of from 27 to 30-candle power. The price is said to be 5s. per ton less than it was last year. There was then a reduction in the price of gas from 4s. 7d. to 4s. 2d. per 1000 cubic feet; and there is every prospect of a further reduction this year—probably of another 5d. Mr. Thomson enters upon his duties on June 1; and it will probably be left for him to advise the Committee upon the amount of the reduction.

The accounts of the Hamilton Corporation gas undertaking came before the Town Council last Thursday. The quantity of coal carbonized in the past financial year (ending March 14 last) was 7302 tons—a decrease of 213 tons as compared with the preceding twelve months. The gas made was 70,058,500 cubic feet—an increase of 8,358,500 cubic feet on the year 1891-2. The unaccounted-for gas in the first half of the past year was at the rate of 35·5 per cent.; in the second half, 13·4 per cent.—an average of 20·6 per cent. for the year, a very large proportion being due to coal workings. The total revenue was £10,123, as compared with £10,038 in 1891-2—an increase of £85. The increased revenue from the sale of gas was £919. During the last seven months of the year, there was a loss of £791, due to the low price of tar and liquor, although a larger quantity was sold; a sum of £450 was sunk in repairs; and extra labour, &c., added £100 to the yard expenses. Dear coal was in use during the greater part of the year. The profit earned was £60. The subject of the damage to gas, water, and drainage pipes by mineral workings was discussed for some time by the Council; and it was then left to the Magistrates to consider the advisability of obtaining the opinion of Counsel, as to whether the owners of minerals can be held liable for the cost of pipe repairs.

The *North British Daily Mail* is responsible for the statement that they understand the Secretary for Scotland has granted the Provisional Order applied for by the Paisley Town Council, to empower them to borrow £20,000 for extensions upon the gas-works. It seems strange that such should be the case, when it is considered that Sheriff Cowan, to whom the Secretary for Scotland remitted to inquire into the circumstances, reported against the scheme, on the ground that the ordinary revenue was fit to meet all necessary extensions during the next ten years.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *May 6.*

Sulphate of Ammonia.—There is not much life in the market; and the further drop in nitrate is not likely to influence buyers' views favourably. Still, in spite of all adverse conditions, the tone remains fairly steady. Makers at all events are firm in their ideas; and the depression all emanates from the dealers, whose ulterior objects cannot be misunderstood. Sulphate being scarce at Hull and Liverpool, quotations remain at £12 to £12 5s.; while Leith is now offered broadcast at £11 15s., and even at £11 12s. 6d. No doubt, therefore, the Scotch sulphate is used for the purpose of depressing the rest of the country. But this will not be an easy matter, as gas sulphate is daily getting scarcer; and there is still a large home trade, and rumour says that many speculative sales will have to be covered before the month end.

LONDON, *May 6.*

Tar Products.—Dealers are doing their best to depreciate values, especially in respect to benzol and pitch. Fortunately, distillers are well sold, and stocks are light; and they are apparently indifferent to the depressing operations. There is a better inquiry and outlet for creosote, which is very welcome to producers, as most of them had large accumulations. Solvent naphtha is in fair request; and tar acids maintain their values, with an excellent inquiry. Business has been done during the week at the following prices: Tar, 13s. Pitch, 24s. to 25s. Benzols, 90's, 1s. 5½d.; 50's, 1s. 4½d. Solvent naphtha, 1s. 1½d. Toluol, 1s. 4½d. Crude benzol naphtha, 30 per cent., 7d. Creosote, 1d. Creosote salts, 17s. Carbolic acid, 60's, 2s. 4d.; 75's, 2s. 10½d.; crystals, 7½d. Cresol, 1s. 10d. Anthracene, nominal, 30 p. ct., "A," 1s. 1d.; "B," 9d.

Sulphate of Ammonia.—Although the market value is said to be £11 15s., less 3½ per cent., there appears to be no business doing. The position looks very much as if there was a conspiracy to depress prices. It is stated that one or two dealers have large buying orders; but, with the view of depressing the market value, they, at the moment, are not covering. There never was such a scarcity of the article as is the case to-day; and, were it not that nitrate is being offered at much lower prices, sulphate, instead of falling, should have seen even better value Gas liquor is quoted at 7s. 6d. to 8s. 6d. per ton.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade—There is a continued weakening tendency in all descriptions of round coal. Even in the better qualities, list rates are to a large extent only nominal—colliery proprietors in many cases readily giving way 3d. to 6d. per ton to effect sales; whilst as to the usual contracts which are now coming forward, a very uneasy feeling prevails with regard to the prices which will have to be taken. For the gas coal contracts, Staffordshire colliery proprietors are competing very keenly, at prices considerably below what Lancashire coalowners at all care to entertain. It is reported that the Staffordshire colliery owners are quoting 5s. 6d. to 6s. per ton at the pit mouth; and already Lancashire coalowners have been cut out of two important contracts, where hitherto their coal has been largely supplied. It is becoming increasingly evident that this season's gas coal contracts will be placed at prices considerably under those which were paid last year; whilst with regard to locomotive fuel, the railway companies are expecting to place their contracts at about 6s. 3d. to 6s. 6d. per ton. Best Wigan Arley at the pit mouth can be bought readily at about 11s. to 11s. 6d. per ton; Pemberton four-feet and seconds Arley do not average more than 9s. 6d. to 10s.; common house-fire coals, 7s. 6d. to 8s.; and the inferior descriptions of round coal are obtainable at any price from 6s. per ton upwards. The shipping trade also continues in a very depressed condition; and ordinary steam coal, delivered at the High Level, Liverpool, or the Garston Docks, is being bought at 7s. 6d. to 8s. per ton. The only section of the trade which shows any firmness is in engine classes of fuel; and this is due more to restricted production of slack than to any increased demand. The present limited supplies of engine fuel coming upon the market are meeting with a ready sale; and in many cases advances of 3d. to 6d. per ton are quoted upon late rates, though it can scarcely be said that there is any actually general advance upon the full prices which have recently been ruling. Burgy scarcely averages more than 6s. 6d.; best slack, 5s. to 5s. 6d.; medium, 4s. 3d. to 4s. 9d.; and common, 3s. 6d. to 4s. per ton. With the continued downward tendency of prices in all descriptions of round coal, the wages question is necessarily becoming a still more serious one. Although for the present Lancashire is holding back till Yorkshire colliery owners can make up their mind, the belief prevails that united action by the two counties is becoming more probable.

Northern Coal Trade.—There has been an increase in the demand for steam coal; and as the period for exports to the Baltic has now practically arrived, a steady trade may be anticipated for a little time to come. Best Northumbrian steam coals are quoted at 8s. 9d. per ton f.o.b.; but occasionally a slight discount is allowed from that price. Second-class steam coals are about 8s. per ton; but the demand for that quality is scarcely so large as is that for best steam. Small steam coals are about 3s. 6d. per ton. For manufacturing coal, there is only a limited inquiry. For gas coals, there is a moderate demand for local consumption; but the export trade is improving, as is customary on the opening of the Baltic ports. From 6s. to 6s. 6d. per ton f.o.b. is the general quotation for gas coals; but in one or two instances a rather higher price is asked. There is little alteration in the demand for coke; and for best Durham qualities, 13s. to 13s. 6d. per ton is the current price. Gas coke is unaltered; and though the production is less, there are still heavy stocks at some of the local gas-works.

Scotch Coal Trade.—There is no appreciable alteration, one way or another, in the coal trade in Scotland; and the report of last week may virtually be repeated. Ell is being sent off in considerable quantities to Russia, and nuts and dross are in good demand; but other sorts are in a most depressed state. Except Glasgow, nearly all the large gas coal contracts have been fixed; and in every case there has been a substantial reduction. It is the same with contracts for other purposes; and there is as yet no indication of a rise in price. The quotations are: Main, 5s. 9d.; ell, 6s. 9d. to 7s.; splint, 6s. to 6s. 3d.; and steam, 8s. per ton f.o.b. Glasgow. Shipments for the week amounted to 156,550 tons—an increase of 31,160 tons upon the preceding six days, mostly from Firth of Forth ports, but a decrease of 10,973 tons as compared with the corresponding week of last year. For the year to date, the total shipments have been 168,523 tons—less than the quantity for the same period of last year by 166,430 tons.

Exhibitions of Gas Appliances.—During the past week, exhibitions of gas appliances were held by the Davis Gas-Stove Company, Limited, at Portsmouth, Northampton, and Wandsworth.——In the Prince of Wales's Rooms, Jersey, Messrs. Richmond and Co., Limited, of Warrington and London, recently held a very interesting exhibition of gas cooking and heating stoves, under the auspices of the Jersey Gas Company. Cookery lectures and demonstrations were given by Miss Owen, of South Kensington. Similar exhibitions, with lectures, have lately been held by them at Westgate and Birchington. The firm have just been entrusted with the manufacture of a new vertical grill, the invention of Mr. W. C. Butler, of Edinburgh, in which, by a double arrangement of gas-jets, the meat is cooked on both sides at once. The appliance is simple in construction, and may be placed on an ordinary dresser or table. Messrs. Richmond and Co. also supplied the exhibits for a display of gas appliances promoted by Messrs. Hutchinson Bros., at Barnsley, last week, at which Miss Owen gave a series of lectures on plain and high-class cookery.——Messrs. W. Parkinson and Co.'s most recent exhibitions have been held at Tamworth and Bilston; Miss Sanderson lecturing at the former, and Miss Cook at the latter place.——Messrs. Fletcher, Russell, and Co. held a very successful exhibition of gas stoves and appliances in the Town Hall, Tewkesbury, last week, with Miss E. Edden's co-operation as lecturess. The same firm also exhibited at Birkenhead, with Mr. W. J. Young as lecturer.——Messrs. C. Wilson and Sons, of Leeds, held last week a successful exhibition at Bingley; Miss Smith, of the Yorkshire School of Cookery, delivering lectures.——The Scottish Gas-Stove Company, of Glasgow and London (successors to Messrs. H. Darwin and Co.), had an exhibition of gas cookers and heaters in the Albert Hall, Edinburgh, last week. This is the third exhibition within three months which has been held in the same place.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

(For Stock Market Intelligence, see ante, p. 819.)

Issue.	Share	When ex-Dividend.	Dividend or Div. Bonus.	NAME.	Paid per Share	Closing Prices.	Rise or Fall in Wk.	Yield upon investment.
£			p. c.	GAS COMPANIES.				£ s. d.
590,000	10	13 Apl.	10½	Alliance & Dublin 10 p. c.	10	16½—17½	..	6 0 0
100,000	10	,,	7½	Do. 7 p. c.	10	12—13	..	5 15 5
300,000	100	3 Jan.	5	Australian (Sydney) 5 % Deb.	100	104—106	..	4 14 8
100,000	20	30 Nov.	8	Bahia, Limited	20	11—12	..	13 6 8
200,000	5	16 Nov.	6½†	Bombay, Limited	5	5¾—6½	..	5 4 0
40,000	5	,,	6½†	Do. New	4	4—4½	..	5 15 6
380,000	Stck.	24 Feb.	11½	Brentford Consolidated	100	216—220	..	5 4 7
180,000	,,	,,	8½	Do. New	100	168—173	..	4 18 3
220,000	20	15 Mar.	11½	Brighton & Hove Original	20	41—43	..	5 6 11
888,500	Stck.	31 Aug.	5	Bristol	100	104—107	..	4 13 5
320,000	20	13 Apl.	11½	British	20	42—4	..	5 4 7
50,000	10	15 Mar.	11½	Bromley, Ordinary 10 p. c.	10	19—20	..	5 15 0
51,510	10	,,	8½	Do. 7 p. c.	10	14½—15½	..	4 9 8
328,750	10	—	—	Buenos Ayres (New) Limited	10	5½—6½	..	— —
200,000	100	3 Jan.	6	Do. 6 p. c. Deb.	100	98—100	..	6 0 0
150,000	20	24 Feb.	8	Cagliari, Limited	20	25—27	..	5 18 6
550,000	Stck.	28 Apl.	12½	Commercial, Old Stock	100	243—248†	+2	5 0 10
165,000	,,	,,	9½	Do. New do.	100	182—187†	..	5 1 7
160,762	,,	15 Dec.	4½	Do. 4½ p. c. Deb. do.	100	127—132	..	4 18 2
800,000	Stck.	15 Dec.	13	Continental Union, Limited	100	234—239	..	5 8 0
200,000	,,	,,*	10	Do. 7 p. c. Pref.	100	192—197	+2	5 1 6
75,000	Stck.	15 Mar.	10	Crystal Palace District	100	187—192	..	5 4 2
486,090	10	27 Jan.	10	European, Limited	10	21½—22½	..	4 8 11
354,060	10	,,	10	Do. Partly paid	10	15—16†	..	4 13 9
5,596,560	Stck.	10 Feb.	12	Gaslight & Coke, A, Ordinary	100	220—224	—½	5 7 1
100,000	,,	,,	4	Do. B, 4 p. c. max.	100	95—99	..	4 0 10
665,000	,,	,,	10	Do. C, D, & E, 10 p.c. Pf.	100	263—268	..	3 14 7
30,000	,,	,,	5	Do. F, 5 p. c. Prf.	100	120 –125	+2	4 0 0
60,000	,,	,,	7½	Do. G, 7½ p. c. do.	100	170—175	+2	4 5 8
1,300,000	,,	,,	7	Do. H, 7 p. c. max	100	169—174	+1½	4 0 5
463,000	,,	,,	10	Do. I, 10 p. c. Prf.	100	260—265	..	3 15 6
476,000	,,	,,	6	Do. K, 6 p. c. Prf.	100	156—160	..	3 15 0
1,061,150	,,	15 Dec.	4	Do. 4 p. c. Deb. Stk.	100	124—128	..	3 2 6
294,850	,,	,,	4½	Do. 4½ p. c. do.	100	130—134	..	3 7 2
908,000	,,	,,	6	Do. 6 p. c. do	100	169—173	..	3 9 4
3,800,000	Stck.	16 Nov.	12	Imperial Continental	100	229—232	+1	5 3 5
75,000	5	30 Nov.	6	Malta & Mediterranean, Ltd.	5	4½—5	..	6 0 0
560,000	100	4 Apl.	5	Met. of Melbourne, 5p. c. Deb.	100	103—105	—1	4 15 3
541,920	20	16 Nov.	5	Monte Video, Limited	20	13½—14½	..	6 18 0
150,000	5	30 Nov.	10	Oriental, Limited	5	7½—8½	..	3 1 2
60,000	5	29 Mar.	7	Ottoman, Limited	5	4—4½	..	7 7 4
166,870	10	—	2	Pará Limited	10	2—2½	..	—
420,000	100	2 May	6	People's Gas of Chicago— 1st Mtg. Bds.	100	102–105*	+½	5 14 3
500,000	100	1 Dec.	6	2nd Do.	100	100–105	..	5 14 3
150,000	10	28 Apl.	5	San Paulo, Limited	10	8¾—9¼*	..	5 5 3
500,000	Stck.	24 Feb.	15½	South Metropolitan, A Stock	100	294—299	+2	5 3 8
1,350,000	,,	,,	12	Do. B do.	100	244—248	+1½	4 16 9
230,000	,,	,,	13	Do. C do.	100	245—255	+2½	5 1 11
750,000	,,	13 Jan.	5	Do. 3 p. c. Deb. Stk.	100	148—152	..	3 5 9
60,000	Stck.	15 Mar.	11½	Tottenham & Edm'nton, "A"	100	225—230	..	5 0 0
				WATER COMPANIES.				
744,897	Stck.	30 Dec.	10	Chelsea, Ordinary	100	265—270	+1½	3 14 1
1,720,252	Stck.	29 Mar.	8	East London, Ordinary	100	212—215	+½	3 14 6
544,440	,,	30 Dec.	4½	Do. 4½ p. c. Deb. Stk.	100	142—145	..	3 2 1
700,000	50	15 Dec.	8½	Grand Junction	50	111—114	..	3 14 7
708,000	Stck.	10 Feb.	11	Kent	100	280—285	+2	3 17 2
1,043,800	100	30 Dec.	9½	Lambeth, 10 p. c. max.	100	243—248	+1	3 16 7
406,200	100	,,	7½	Do. 7½ p. c. max.	100	199—204	+2	3 14 0
825,000	Stck.	29 Mar.	4	Do. 4 p. c. Deb. Stk.	100	129—132	..	3 0 7
500,000	100	10 Feb.	12½	New River, New Shares	100	329—334	+2	3 12 8
1,000,000	Stck.	27 Jan.	4	Do. 4 p. c. Deb. Stk	100	133—137	..	2 18 5
902,300	Stck.	15 Dec.	6½	S'thwk & V'xhall, 10 p. c. max.	100	165—170	+1	3 16 5
126,500	100	,,	6½	Do. D 7½ p. c. do.	100	145—150	..	4 6 8
1,155,066	Stck.	15 Dec.	10	West Middlesex	100	262—267	+2	3 14 11

*Ex Div.

† Next dividend will be at this rate.

Stalybridge Corporation Gas Supply.—At the monthly meeting of the Stalybridge Town Council yesterday week, Alderman Hall, the Chairman of the Gas Committee, gave some statistics which went to prove that, owing to bad trade and the cotton strike, there had been a decrease of 5 million cubic feet in the consumption of gas during the past year. There was really a falling off to the extent of 9 millions in the consumption of certain large firms, but three other firms had increased theirs; and, taken altogether, there was a less consumption by 13 million cubic feet than there would have been if the mills had all been working. Proceeding to deal with some locally published strictures upon the Committee, Alderman Hall quoted figures, on the strength of which he claimed that the Gas Committee since the Corporation took over the concern from the old Company had reduced the price of gas without lowering its quality. Not only had the borough benefited in this way to the extent of nearly 5d. per 1000 cubic feet; but, with the profits on five years' consumption, the Corporation had also effected a saving of £11,085, besides devoting £12,204 to reducing loans—a saving to the ratepayers of £23,289.

The Finances of the Bolton Corporation Water-Works Department.—At the meeting of the Bolton Town Council last Wednesday, the revenue account of the Water Department for the past financial year was submitted. The statement was received, and £1500, a portion of the credit balance, was directed to be carried to the renewal fund account, and £11,527, the remainder, to be transferred to the borough fund account in aid of the borough rate. Mr. Proctor took exception to the amount proposed to be carried to the renewal fund, and moved, as an amendment, that it be increased to £2000. They had, he said, a capital in the water-works of £750,000, and yet they had no depreciation or reserve fund. They had a sinking fund of £4000; but he agreed with Mr. Chamberlain that there should be no sinking fund for water-works, which became more valuable from year to year. As to the renewal fund, they had scores of miles of pipes which had been laid in the ground for many years and had been depreciating all the time, yet the Committee had not a penny to their credit, except the £1500, to meet the expenditure which might be required. Mr. Cooper seconded the amendment. Alderman Cannon asked the Council to confirm the proposals of the Committee. He contended that they spent sufficient every year to keep the works in perfect condition; and he did not anticipate disaster. The amounts which the Committee had asked for had always been sufficient. The amendment was defeated by 29 votes to 19; and the minutes were approved.

Southampton Gaslight and Coke Company.—The half-yearly meeting of this Company was held last Wednesday. The Directors reported that the profit and loss account showed that the amount available for dividend was £12,719. From this sum, the Directors recommended the payment of maximum dividends amounting to £7582 for the half year on all classes of shares, less income-tax; leaving a balance of £5137 to be carried forward. During the six months there was an increase in the sale of gas, as compared with the corresponding period of 1891, of 6,500,000 cubic feet. The Directors had made a further reduction in the price of gas of 2d. per 1000 cubic feet throughout the whole of the district from the March quarter; the price now being 2s. 8d. in the town, and 3s. 2d. in the outlying districts. The Chairman (Mr. R. C. Hankinson, J.P.), in moving the adoption of the report, stated that its two prominent points were the increased sale of gas during the half year, and the reduction of price which the Directors had felt justified in making. As regarded the working, he might repeat what he mentioned at the last meeting—that the Board had made a very favourable contract for coals; and the reduction in the cost of working the concern would, in consequence of this, more than compensate for the reduction in income from the sale of residuals. The coals carbonized during the six months amounted to 15,935 tons, against 15,331 tons for the corresponding half of 1891; the increase being 604 tons. The cost during the six months of 1891 was £10,348, against £10,061 in 1892—being a decrease of £287; so that, although 604 tons more had been carbonized, there had been an actual decrease in the working expenses. The plant they had put up for dealing with the ammoniacal liquor had proved to be a wise step, the net profit last year from this source having been £1722; whereas the receipts for ammoniacal liquor in the preceding year came to only £586—a clear gain of £1136 being thus shown. The increase in the sale of gas for the year, as compared with 1891, amounted to 11 million cubic feet. With regard to capital, the last sale of 200 shares realized £7167. The Directors were obliged to raise capital from time to time; and this was principally expended in the extension of the works. The business was growing at such a rate that it was absolutely necessary, under Mr. Paddon's sanction and direction, to enlarge the works very considerably. Their Manager (Mr. S. W. Durkin) had told him it was satisfactory to find the day consumption was increasing; this being due to the greater use now being made of the various kinds of cooking and other stoves. The motion for the adoption of the report was seconded, and carried unanimously.

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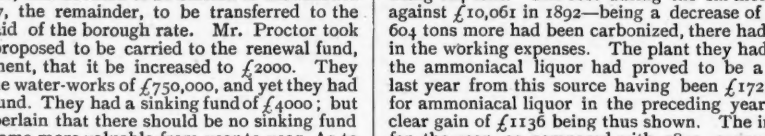

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*** See Advertisement p. II., centre of JOURNAL.
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Orders for Alterations in, or Stoppages of PERMANENT ADVERTISEMENTS should be received not later than the FIRST POST on SATURDAY.

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FOR SALE—A perfectly new 20,000 cubic feet per hour EXHAUSTER, with Steam-Engine combined, including Hydraulic Gas Governor, Bye-Pass Valves, and Connections.

For further particulars, apply to Mr. T. G. MARSH, 41, Corporation Street, MANCHESTER.

FOR SALE, at the Barnsley Gas-Works— Four 12 feet square PURIFIERS, with Centre-Valve, Connections, &c.

The above are in good condition, and may now be seen at work; only being sold to make room for larger.

For further particulars, apply to
JOHN HUTCHINSON,
Manager.

THE Southampton Gaslight and Coke Company have FOR DISPOSAL, and taken apart ready for removal by Rail or Water, the SIDE and BOTTOM PLATES of a Cast-Iron GASHOLDER TANK, about 61 feet diameter by 18 feet deep. Weight about 125 tons. Makers, Westwood and Wright. To be removed at Purchaser's own risk.

May be viewed on application to Mr. S. W. DURKIN, Manager, Gas-Works, SOUTHAMPTON.

RUSHDEN AND HIGHAM FERRERS DISTRICT GAS COMPANY, LIMITED.

IN consequence of the Amalgamation of the Rushden and Higham Ferrers Gas Companies, and the erection of entirely new Works, the Directors of the above Company have the following PLANT FOR SALE:—

One TWO-LIFT GASHOLDER. Outer Lift, 35 ft. by 15 ft.; inner do., 33 ft. 6 in. by 15 ft.
One SINGLE GASHOLDER, 35 ft. by 12 ft.
One TWO-LIFT GASHOLDER, 30 ft. by 20 ft.
SCRUBBER.
PIPE and ANNULAR CONDENSERS.
PURIFIERS.
STATION METERS.
RETORT IRONWORK, HYDRAULIC MAINS.
Various VALVES and CONNECTIONS.

For particulars and permission to view, apply to JNO. T. LEWIS, Engineer, Gas-Works, WELLINGBOROUGH.

MATLOCK AND DISTRICT GAS COMPANY.

THE Directors are prepared to receive TENDERS for the supply of 2000 tons of GAS COAL, more or less, and 300 tons of CANNEL COAL, to be delivered at the Matlock Bridge Railway Station, during the period of Twelve Months between the 1st of July, 1893, and the 30th of June, 1894.

The Directors reserve the right to accept tenders for the whole or any portion of any quantity offered, and do not bind themselves to accept the lowest or any tender.

Sealed tenders, endorsed "Tender for Coal," stating price, and giving information as to the quality of the Coal and where in use, to be sent to the undersigned on or before Tuesday, the 16th of May, 1893.

By order,
ROBERT HALL,
Secretary.
Matlock, May 4, 1893.

BOROUGH OF RICHMOND, SURREY, WATER-WORKS.

TO WELL SINKERS.

THE Town Council of the Borough of Richmond, Surrey, invite TENDERS for Providing and Sinking CAST-IRON CYLINDERS in the Well at Water Lane, Richmond.

Plan may be seen, and Sections and Specification, with Form of Tender (for which a charge of half-a-guinea will be made, which will be returned on receipt of a *bonâ fide* tender), and further information may be obtained on application to the Engineer, Mr. W. G. Peirce, Borough Water-Works Office, Riverside, Richmond, Surrey.

No tender will be recognized unless properly filled up on the prescribed form attached to the Specification, nor unless the same is received at the Town Clerk's Office within the limited time; and no expenses or claims will be allowed or paid to any person whether tendering or not.

The Contractor will be required to give security for the due performance of his Contract, as stipulated by the Public Health Act, 1875. The Form of Contract and Bond will be prepared by the Town Clerk, at whose Office particulars thereof may be ascertained.

Sealed tenders, endorsed "Tender for Cast-Iron Cylinders, &c.," and addressed to the Chairman of the Water Supply Committee, must be delivered at the Town Clerk's Office on or before Monday, the 5th day of June, 1893.

The Council do not bind themselves to accept the lowest or any tender.

(Signed) FREDK. B. SENIOR,
Town Clerk.
Town Clerk's Office,
Vestry Hall, Richmond, Surrey,
May 2, 1893.

SADLER AND CO., LIMITED, MIDDLESBROUGH; ULVERSTON (BARROW); PORTSMOUTH; CARLTON; STOCKTON; 315, St. Vincent Street, GLASGOW; 10, Marsden Street, MANCHESTER; and 85, Water Street, NEW YORK. Tar Distillers, Manufacturers of all TAR PRODUCTS, ALIZARINE and other TAR COLOURS, BICHROMES, OXALIC ACID, ALKALIES, LIQUOR AMMONIA, AMMONIA, SULPHATE, &c.

Head Office: MIDDLESBROUGH. Correspondence invited.

PATENTS, DESIGNS, AND TRADE MARKS.

INVENTIONS Protected by Letters Patent. TRADE MARKS REGISTERED at home and abroad. Advice on all questions relating to above. Handbook gratis.

Apply to J. C. CHAPMAN, Chartered Patent Agent, 70, Chancery Lane, LONDON.

THE Gas Committee of the Penrith Local Board are prepared to receive TENDERS for the supply of the COAL and CANNEL required during the Year ending the 30th of June, 1894.

Particulars may be obtained on application to
E. SHAUL,
Manager.
Gas-Works, Penrith,
May 6, 1893.

FAREHAM GAS AND COKE COMPANY.

THE Directors invite Tenders for the supply of 1200 to 1400 tons (more or less) of best fresh wrought GAS COAL, delivered by Water, and metered free into Carts at their Wharf at the Works, in such quantities as they shall from time to time require during the year ending the 30th of June, 1894.

Quarterly settlements.

Tenders, specifying description and the Pits from which the Coal is to be supplied, to be sent in to me by Twelve o'clock on the 15th inst.

The lowest or any tender not necessarily accepted.
HARRY SMITH,
Secretary.
Gas-Works, Fareham, Hants.,
May 9, 1893.

LYMM LOCAL BOARD.

THE above Board are prepared to receive TENDERS for the supply of GAS COAL and CANNEL, to be delivered at their Gas-Works in Lymm for a term of One Year from the 1st day of July, 1893.

The probable quantities required are about 1200 tons of Gas Coal and 250 tons of Cannel, which must be freshly wrought and well screened, and free from Sulphurous Pyrites, or other objectionable matter; but the Board reserve the right of increasing or decreasing the quantities named.

The person whose tender is accepted will be required to enter into an agreement with the Board for the due performance of his contract.

Sealed tenders, stating price per ton delivered alongside the Works, to be sent to Wm. Mullard, Esq., Clerk to the Board, on or before the 22nd day of May, 1893, endorsed "Coal and Cannel."

The Board have no special form of tender, and do not bind themselves to accept the lowest or any tender.

Further particulars may be had on application to
WILLIAM SEVERS,
Manager.
Gas-Works, Lymm, Cheshire,
May 4, 1893.

LYMM LOCAL BOARD.

THE above Board are prepared to receive TENDERS for the purchase of the surplus TAR and AMMONIACAL LIQUOR made at their Gas-Works, for a term of One Year from the 1st day of July, 1893.

The Tar and Liquor will be delivered free into Contractor's Boat on the Bridgewater Canal.

The Purchaser will have to enter into an agreement with the Board for the due performance of his contract.

Sealed tenders, stating price per ton for Tar, and price per ton for Liquor (5% Twaddel), to be sent to Wm. Mullard, Esq., Clerk to the Board, on or before the 22nd day of May, 1893, endorsed "Tar."

The Board do not bind themselves to accept the highest or any tender.

Further particulars may be had on application to
WILLIAM SEVERS,
Manager.
Gas-Works, Lymm, Cheshire,
May 4, 1893.

BOROUGH OF BURTON-UPON-TRENT.

TO COLLIERY PROPRIETORS.

THE Mayor, Aldermen, and Burgesses of the Borough of Burton-upon-Trent, acting by the Council, are prepared to receive TENDERS from Colliery Proprietors for the supply of from 1000 to 25,000 tons of best Screened GAS COAL, to be delivered, in Sender's or Railway Company's Trucks at the Gas-Works Railway Siding, Burton-upon-Trent, between the 1st day of July next and the 30th day of June, 1894.

The deliveries are to be made in such quantities and at such times as may be directed by the Manager.

Payment, Net Cash Monthly.

Tenders, enclosed in an envelope, sealed and endorsed "Tender for Coal," are to be delivered to me at or before Ten a.m. on Friday, the 2nd day of June next.

The Council do not bind themselves to accept the lowest or any tender.

F. L. RAMSDEN,
Manager and Engineer.
Gas-Works, Burton-upon-Trent,
May 6, 1893.

BOROUGH OF MANSFIELD.

THE Gas Committee invite Tenders for the supply of 5500 tons of best screened GAS COAL and NUTS, also 500 tons of CANNEL, for use at the Gas-Works, to be supplied for One Year ending May 31, 1893.

Particulars may be obtained from Mr. Hearson, Gas-Works, Mansfield.

Tenders to be sent in on or before the 31st of May, 1893, marked "Tender for Coal," and addressed to

R. J. PARSONS,
Town Clerk.

Mansfield, May 5, 1893.

LINCOLN CORPORATION.
(GAS DEPARTMENT.)

TENDERS FOR COAL.

THE Gas Committee of the Lincoln Cor- poration invite TENDERS for the supply of 20,000 tons of screened GAS COAL, COBBLES, and NUTS, to be delivered during a period commencing the 1st of July, 1893, and terminating the 30th of June, 1894.

Further Particulars and Forms of Tender may be obtained from the undersigned.

Sealed and endorsed tenders, addressed to the Chairman of the Gas Committee, must be delivered on or before the 29th inst.

The Committee do not bind themselves to accept the lowest or any tender.

JNO. CARTER,
Manager.

Gas Offices, Lincoln,
May 5, 1893.

ELSECAR, WENTWORTH, AND HOYLAND GAS COMPANY.

THE Directors of the Elsecar, Went- worth, and Hoyland Gas Company are prepared to receive TENDERS for Two 8 feet square by 4 ft. 6 in. deep PURIFIERS, with Centre-Valve to work Four Purifiers, three on and one off, 10-inch Connections.

Parties tendering to supply and erect complete with Wrought-Iron Covers, Wood Grids, T-Iron Bearing Bars, and Lifting Gear for Covers; ground space, 20 ft. by 11 ft.

The Gas Company to excavate and put in Foundations for the above.

Further information may be had by applying to the Manager, Gas-Works, Elsecar, near Barnsley.

Tenders, addressed to the Chairman, to be sent in not later than the Morning of May 27, on which day the tenders will be opened.

H. C. OATES.

Elsecar, Barnsley,
April 24, 1893.

RAMSGATE CORPORATION.
(GAS AND WATER DEPARTMENT.)

THE Gas and Water Committee invite TENDERS for the supply of first-class NEWCASTLE GAS COAL in three Annual quantities of 14,000 tons each, delivered free into Carts on the Quay of Ramsgate Harbour. The first 14,000 tons to be delivered, in equal monthly quantities, between the 1st of July, 1893, and the 30th of June, 1894; and the second and third years' supply, in equal monthly quantities, between the 1st of July, 1894, and the 30th of June, 1895, and the 1st of July, 1895, and the 30th of June, 1896.

Separate prices to be named for each annual quantity.

Tenders to be sent in not later than Ten a.m. on Monday, May 15, addressed to the Chairman of the Gas and Water Committee, Hardres Street, Ramsgate, and endorsed "Coals."

The Committee do not bind themselves to accept the lowest or any tender.

Full Particulars and Form of Tender on application to

WILLIAM A. VALON,
Engineer.

WESTGATE AND BIRCHINGTON GAS COMPANY.

THE Directors of the above Company invite TENDERS for the supply of first-class NEWCASTLE GAS COAL, in three Annual quantities of 1675 tons each, to be delivered free in Trucks, at the Westgate Railway Station, L. C. & D. Line. The first 1675 tons to be delivered, in equal monthly quantities, between the 1st of July, 1893, and the 30th of June, 1894; and the second and third years' supply, in equal monthly quantities, between the 1st of July, 1894, and the 30th of June, 1895, and the 1st of July, 1895, and the 30th of June, 1896.

Separate prices to be named for each annual quantity.

Tenders to be sent in not later than May 16, addressed to the Chairman of the Westgate and Birchington Gas Company, 3, Prince's Street, Storey's Gate, Westminster, S.W., and endorsed "Coals."

The Directors do not bind themselves to accept the lowest or any tender.

Full Particulars and Form of Tender on application to

WILLIAM A. VALON,
Engineer.

LIVERPOOL UNITED GASLIGHT COMPANY.

THE Directors of the Liverpool United Gaslight Company are prepared to receive TENDERS for the supply of 120,000 tons of COAL, to be delivered at the various Works of the Company during the period of Twelve Months between the 1st of July, 1893, and the 30th of June, 1894.

Tenders will be received for the whole or any portion of the above quantity.

The Directors reserve the right to accept tenders for the whole or any portion of any quantity offered, and do not bind themselves to accept the lowest or any tender.

Full Particulars and printed Forms of Tender can be obtained on application to the undersigned, at the Gas Office, Duke Street, Liverpool, to whom tenders, on the printed form, must be sent on or before Wednesday, the 17th of May, endorsed "Tender for Coal."

By order,
WILLIAM KING,
Engineer.

Gas Office, Duke Street, Liverpool,
April 27, 1893.

BANDON TOWN COMMISSIONERS (CO. CORK).

GAS COAL.

TENDERS are invited for the supply of about 400 tons of best screened GAS COAL, to be delivered free, at the Albert Quay, Cork, on or before the 20th day of July, 1893.

The name and quality of the Coal to be specified in the tender.

Tenders, endorsed "Tender for Gas Coal," to be forwarded to the Chairman by the 12th inst.

The Commissioners do not bind themselves to accept the lowest or any tender.

By order,
JOHN M'DONNELL,
Town Clerk.

Gas-Works, Bandon,
May 2, 1893.

CAMBRIDGE UNIVERSITY AND TOWN GAS-LIGHT COMPANY.

TENDERS FOR COAL.

THE Directors of the above Company are prepared to receive TENDERS for the supply of 20,500 tons of CANNEL, best well-screened GAS COAL, and NUTS, to be delivered between the 1st of July, 1893, and the 30th of June, 1894.

Forms of Tender and Specification may be obtained on application to the undersigned.

Sealed tenders to be sent to the Chairman of the Company not later than the 12th day of June next, endorsed "Tender for Coal."

The Directors do not bind themselves to accept the lowest or any tender.

By order,
W. DUESBURY,
Manager.

Gas-Works, Cambridge,
May 5, 1893.

BOROUGH OF BARROW-IN-FURNESS.

SUPPLY OF COAL AND CANNEL.

THE Corporation are prepared to receive TENDERS, on forms to be obtained at the Office of the Gas-Works Manager, for the supply of screened GAS COAL and CANNEL for the Year ending the 30th of June, 1894.

Tenders, addressed to the Chairman of the Gas and Water Committee, and endorsed "Tender for Coal," to be delivered at the Town Clerk's Office not later than Twelve o'clock Noon on Wednesday, the 17th inst.

The lowest or any tender not necessarily accepted.

By order,
C. F. PRESTON,
Town Clerk.

Town Hall, Barrow-in-Furness,
May 4, 1893.

COUNTY BOROUGH OF WIGAN.

THE Gas Committee invite Tenders as follows:—

(*a*) HYDRAULIC MAINS, FOUL MAINS, ASCENSION, BRIDGE, and DIP PIPES, &c., &c., for a Block of Ten Benches of Through Retorts.
(*b*) 140 Patent Faced MOUTHPIECES.
(*c*) Two Sets of STAIRS.
(*d*) EXTENSION of COKE STAGE.

Drawings and Specification may be seen, and other Information obtained on application to the undersigned.

Tenders on form prescribed, sealed and endorsed "Tender for Hydraulic Mains, &c.," to be delivered to the Town Clerk, Arthur Smith, Esq., on or before Tuesday, the 16th inst.

The Committee do not bind themselves to accept the lowest or any tender.

JOS. TIMMINS,
Engineer.

Wigan, May 2, 1893.

CORPORATION OF ROTHERHAM.
(GAS DEPARTMENT.)

THE Gas Committee are prepared to re- ceive TENDERS for the supply and delivery of—
WROUGHT-IRON COOLING MAIN,
SPECIAL CASTINGS for Do.,
And HYDRAULIC MAIN VALVES.

Particulars and Form of Tender may be had on application to the Gas Engineer, Mr. C. B. Newton.

The Contractor whose tender may be accepted by the Corporation is required to pay his workmen (whether artisans or labourers) not less than the minimum standard rate of wages paid in Rotherham and District for the time being in each branch of trade, and to observe the recognized hours and proper conditions of labour.

Tenders to be delivered, sealed, at the Town Clerk's Office, Rotherham, not later than Wednesday, the 17th inst.

By order,
H. H. HICKMOTT,
Town Clerk.

Council Hall, Rotherham,
May 6, 1893.

TENDERS FOR GAS COALS.

THE Directors of the Tonbridge Gas Company are prepared to receive TENDERS for the supply of 3500 tons of the best Screened GAS COAL or NUTS, from the Districts of Durham or South Yorkshire, to be delivered at such time and in such quantities as may be required between the 1st day of July next and the 31st day of May, 1894, either in Trucks at the Tonbridge Station of the S.E.R., or by Barge alongside the Gas Company's Wharf, which abuts the River Medway.

Parties tendering must give full particulars (with analysis) of the Coal they propose to supply, and name the Pit from which the same will be raised.

Terms and Conditions may be obtained on application to the undersigned.

Sealed tenders to be sent in not later than the 25th inst., addressed to the Chairman of the Tonbridge Gas Company, and endorsed "Tender for Gas Coal."

The Directors do not bind themselves to accept the lowest or any tender.

THOMAS WILTON,
Secretary.

Tonbridge, May 6, 1893.

BOROUGH OF HEYWOOD.

THE Gas Committee invite Tenders for the supply of 9000 tons of COAL (Screened, Nuts, or Cobbles) and 1000 tons of CANNEL.

Specification and Form of Tender may be obtained on application to Mr. W. Whatmough, Gas Manager.

Sealed tenders, marked "Coal," to be sent to me not later than Tuesday, the 16th of May, 1893.

By order,
A. B. PILLING,
Town Clerk.

Municipal Buildings, Heywood,
April 19, 1893.

TO COAL MERCHANTS, SHIP OWNERS, AND OTHERS.

THE Directors of the Torquay Gas Com- pany are prepared to receive TENDERS for the supply of about 13,000 tons of best approved GAS COAL, to be delivered before the 1st of May, 1894.

Further Particulars and Forms of Tender to be obtained from Mr. Beynon, the Engineer of the Company, Hollacombe, Paignton; and tenders to be sent to the undersigned, on or before the 6th of May next.

The lowest tender not necessarily accepted; and the Directors reserve the right to accept part of any tender.

By order,
JOHN KITSON,
Secretary.

Torquay, April 20, 1893.

COUNTY BOROUGH OF SALFORD.
(GAS DEPARTMENT.)

COAL AND CANNEL.

THE Gas Committee are prepared to receive TENDERS for the COAL and CANNEL required at their Works during a period of One, Two, or Three Years.

Forms of Tender and Conditions of Contract may be obtained on application to the Gas Engineer, Gas Offices, Bloom Street, Salford.

Sealed tenders, endorsed "Tender for Coal," addressed to the Chairman of the Gas Committee, Town Hall, Salford, to be delivered to me not later than Five p.m., on Thursday, May 18, 1893.

By order,
SAML. BROWN,
Town Clerk.

Town Hall, Salford,
May 2, 1893.

CORPORATION OF LEICESTER.

COAL TENDERS.

THE Gas, Committee of the above Cor- poration are prepared to receive TENDERS for the supply of COALS, COBBLES, or NUTS (about 110,000 tons per annum) for One, Two, or Three Years ending May 31.

Particulars and Form of Tender can be obtained on application to the Engineer.

Tenders, addressed to Alderman Lennard, Chairman, and endorsed "Tender for Gas Coal," to be delivered at these Offices not later than Eleven o'clock a.m. on Saturday, the 3rd of June next.

The Committee do not bind themselves to accept the lowest or any tender.

ALFRED COLSON, M.Inst.C.E.,
Engineer and Manager.

Gas Offices, Millstone Lane, Leicester,
May 4, 1893.

BRADFORD CORPORATION WATER-WORKS.

TO CONTRACTORS.

CONTRACT NO. 1.—GOUTHWAITE RESERVOIR. NIDD VALLEY WORKS.

THE Corporation of Bradford invite TENDERS for the construction, and maintenance for Twelve Months after completion, of a large COMPENSATION RESERVOIR and Works connected therewith at Gouthwaite, situate about 2¼ miles from Pateley Bridge.

The Works will comprise:—

1. Masonry Dam, Earth Embankment, Outlet-Valve Towers, Culverts, Bridge of fourteen Spans, Waste Channels, Gauge Basin, and River Walls.
2. The opening and working of Stone Quarry, construction of Tramway Line from Quarry to Embankment, Masonry Bridge, and Works connected therewith.
3. The formation of about 2¼ miles of New Roads, including Bridges and Culverts.
4. The erection of about 7½ miles of Boundary and Road Walls, with Entrance Gates and other Works.

The Drawings and Specification of Works may be seen, and Copy of the Specification, with Conditions, Bills of Quantities, and Form of Tender, may be obtained at the Office of Mr. James Watson, M.Inst.C.E., the Corporation Water-Works Engineer, Town Hall, Bradford, on and after Friday, the 12th inst., on payment of Five Guineas, which sum will be returned in full as soon as practicable after the receipt of a *bonâ fide* Tender, with the Bill of Quantities and Schedule fully priced out.

An Assistant Engineer will meet intending Contractors at Stripe Head Farm, Wath, Pateley Bridge, on Friday, the 19th inst., Wednesday, the 24th inst., Tuesday, the 30th inst., and Friday, the 2nd day of June next, each day at One o'clock p.m., to show them over the Site of the Works, the Shafts sunk on the line of the Embankment, and the Quarry, and to supply any other information required.

Sealed tenders, endorsed "Tender for Gouthwaite Reservoir," to be sent to the Town Clerk at the undernamed Office not later than Thursday, the 8th of June next.

An assurance must be given by each Contractor that he pays to the workmen employed by him not less than the minimum standard rate of wages.

The Corporation do not bind themselves to accept the lowest or any tender.

By order,
W. T. M'GOWEN,
Town Clerk.

Town Clerk's Office, Town Hall,
Bradford, May 4, 1893.

TOTTENHAM AND EDMONTON GASLIGHT AND COKE COMPANY.

SALE BY TENDER OF £15,000 NEW STOCK, 1882.

IN pursuance of the Tottenham and Edmonton Gas Act, 1883, Notice is hereby given that it is the intention of the Directors to SELL BY TENDER £15,000 of NEW STOCK of the Company, to be paid up in full on or before the 31st of July next, after which date Dividend will commence to accrue, such Stock being the second portion of additional Capital authorized to be raised by Resolutions passed at an Extraordinary Meeting of the Proprietors, held on the 22nd of February, 1890, under the powers of the above-mentioned Act.

The Dividend on the Stock will be calculated half yearly up to the 31st of December and the 30th of June in each year, and will be paid by warrant issued within one week following the Half-Yearly Meeting of the Company, usually held on the last Saturday in February and August respectively in each Year.

A Deposit of 10 per cent. of the nominal amount of the Stock tendered for must accompany each tender.

Any amount not being less than £5, or a multiple thereof, may be tendered for; and the Stock will be registered in the Company's Books in the names of Allottees or their Nominees free of expense.

The minimum price below which no tender will be accepted has been fixed at One Hundred and Fifty Pounds Sterling (£150) for each One Hundred Pounds (£100) of Stock.

Particulars and Conditions of tender may be obtained on application to this Office; and sealed tenders must be sent in not later than Four o'clock in the Afternoon on Friday, the 16th day of June next.

By order of the Board,
JAMES RANDALL,
Secretary.

Offices of the Company:
Willoughby Lane, Tottenham,
May 5, 1893.

WEST HAM GAS COMPANY.

SALE OF 1750 SHARES.

MR. ALFRED RICHARDS is instructed by the Directors of the Company to SELL BY AUCTION, at the Mart, E.C., on Tuesday, May 30, at Two o'clock precisely, in Lots of 10 Shares each, 1750 £10 SHARES in the West Ham Gas Company.

The authorized Standard Dividend is 7 per cent., subject to the usual Sliding Scale Clauses.

The last Dividend on the same class of Shares was 5 per cent. per annum.

Particulars of the SECRETARY at the Company's Offices, STRATFORD, E.; of MESSRS. HILLEARY, Solicitors, 5, FENCHURCH BUILDINGS, E.C.; and of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

IMPERIAL CONTINENTAL GAS ASSOCIATION.

INCORPORATED BY ACT OF PARLIAMENT.

NOTICE is hereby given, that the Half-YEARLY ORDINARY GENERAL MEETING of the Proprietors of this Association was held at the City Terminus Hotel, Cannon Street, London, on Tuesday, the 2nd inst.,

Sir JULIAN GOLDSMID, Bart., M.P., in the chair, when the following Resolutions were unanimously passed.

That the Report of the Directors upon the affairs of the Association be received, adopted, and entered upon the Minutes.

That a Dividend of 5 per cent. for the Half Year ended the 31st of December last, and a Bonus of 1 per cent., be declared upon the £3,800,000 Stock of the Association, and that the same be payable, free of Income-Tax, on and after the 1st of June next.

That Robert Tindall, Esq., be re-elected a Director of the Association.

That Sir Julian Goldsmid, Bart., M.P., be re-elected a Director of the Association.

That Francis Bassett, Esq., be re-elected a Director of the Association.

That Joseph Sebag Montefiore, Esq., be re-elected an Auditor of the Association.

That the cordial thanks of the Meeting be given to the Directors for their able management of the affairs of the Association, to the Chairman for his conduct in the chair this day, to the Secretary and the London Staff, and to Mr. H. V. Lindon, the Agents, Engineers, and other Officers of the Association on the Continent.

And Notice is further given, that an EXTRAORDINARY GENERAL MEETING of the Proprietors was held on the said 2nd inst., for the purpose of considering a proposal of the Board of Directors to authorize the borrowing of a sum of Money on Mortgage, Debenture, or Debenture Stock, in accordance with the Provisions of the Imperial Continental Gas Association Act, 1893, and, if approved, to order the same.

Sir JULIAN GOLDSMID, Bart., M.P., presided; and the following Resolution was unanimously passed:—

That the Board of Directors be and they are hereby authorized, in accordance with the Provisions of the Imperial Continental Gas Association Act, 1893, to borrow the sum of £350,000 on such terms, and in such manner, as they shall think fit.

By order of the Board,
R. S. GARDINER,
Secretary.

21, Austin Friars, London, E.C.,
May 3, 1893.

Price 6s., Cloth Bound, Bevelled Boards.

THE
GUIDE-FRAMING OF GASHOLDERS
AND OTHER PAPERS
CHIEFLY RELATING TO
STRAINS IN STRUCTURES CONNECTED WITH GAS-WORKS.
BY
F. SOUTHWELL CRIPPS, Assoc. M. Inst.C.E.

LONDON:
WALTER KING, 11, Bolt Court, FLEET STREET, E.C.

Fcap. 4to, Cloth, price 7s. 6d., post free.

Practical Photometry.
By William Joseph Dibdin, F.I.C., F.C.S.,

London: WALTER KING, 11, Bolt Court, FLEET ST., E.C.

NOTICE OF REMOVAL.
TO GAS ENGINEERS & MANAGERS.
CROWTHER BROS.,
Contractors for Retort Setting, Erection of Gas Apparatus, and General Repairs, have removed from 384, Mile End Road, to
152, TEVIOT ST., ST. LEONARD'S ROAD,
POPLAR, LONDON, E.

ROBERT MARSHALL,
CANNEL COAL MERCHANT,
97, WELLINGTON STREET, GLASGOW.

Prices and Analysis of all the Scotch Cannels on application

AUG. KLÖNNE,
DORTMUND (GERMANY).
REGENERATIVE FURNACES.
Unsurpassed in
Efficiency, Economy, Durability, and Easy Working.

COKE BREAKERS,
PRICES REDUCED.
(THOMAS & SOMERVILLE'S PATENT.)
New Design, with two Cutting Rollers, making less Breeze than their old pattern.

For Exhauster Advertisement, see last week.

GEORGE WALLER & CO.,
PARK STREET, SOUTHWARK, E.C.,
And at STROUD, GLOUCESTERSHIRE.

MEIKLEJOHN'S PATENT
Improved Slide-Valve Anti-Dip.
Is perfectly reliable in action, and requires no attention. Has all the advantages of the Dip and Anti-Dip combined.
Is cheap and easily fixed to any form of main.
Will be found the most efficient appliance of the kind yet introduced.
Further particulars and price from
C. MEIKLEJOHN,
GAS-WORKS, RUGBY.
(Late N. MEIKLEJOHN, Longwood.)

NIDDRIE CANNEL
A FIRST-CLASS CANNEL COAL,
Yielding a large volume of rich Gas, and fully 60 per cent. of first-class Coke.
FOR ANALYSIS, PRICE, AND ALL OTHER PARTICULARS, APPLY TO
The Niddrie & Benhar Coal Co., Ltd.,
4, York Buildings, Queen Street,
EDINBURGH.
Telegrams: "BENHAR, Edinburgh."

CAST-IRON PIPES
FOR GAS AND WATER.
Pipes, One to Six inch Bore, kept in Stock. Also a very large assortment of all sizes of Bends, T-pieces, and Specials ready for despatch on receipt of Order.
VALVES
FOR GAS, WATER, AND STEAM.
TELEGRAMS: "PIPES GLASGOW."
WM. MACLEOD & CO.,
56, ROBERTSON STREET, GLASGOW.

TROTTER, HAINES, & CORBETT,
Brettell's Estate
FIRE-CLAY & BRICK WORKS,
STOURBRIDGE.
Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.
Proprietors of
BEST GLASSHOUSE POT & CRUCIBLE CLAY.
SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.

JAMES OAKES & Co.,
ALFRETON IRON-WORKS, DERBYSHIRE,
AND
Wenlock Iron Wharf, 21 & 22, Wharf Road,
CITY ROAD, LONDON, N.
Manufacture and keep in Stock at their Works (also large stock in London)
PIPES and CONNECTIONS, 1¼ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas Water, Railway, Telegraph Chemical, Colliery, and other Companies.
NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with bolts, nuts, and covers, and rendering leakage impossible.

LONDONDERRY GAS COALS
FROM THE
MARQUIS OF LONDONDERRY'S COLLIERIES,
COUNTY OF DURHAM.
Available output up to 5000 tons per day.
Yield of Gas 11,000 cubic feet per ton of Coal as per analysis by
Mr. John Pattinson, F.C.S., F.I.S.
FOR PRICES AND PARTICULARS, APPLY TO
S. J. DITCHFIELD,
SEAHAM HARBOUR, COUNTY OF DURHAM.

UNEQUALLED.
Gas Companies are solicited to try Samples of the
MIRFIELD
BLACK BED GAS COAL.
Prices and Analysis on application.
MIRFIELD (GAS-COAL) COLLIERY COMPY.
RAVENSTHORPE, NEAR DEWSBURY.

T. B. KITTEL, SHEFFIELD.
CONTRACTS FOR SUPPLIES OF ANY OF THE PRINCIPAL
ENGLISH & SCOTCH CANNELS.
REAL SILKSTONE GAS COAL
ANALYSIS AND PRICES ON APPLICATION.
T. B. KITTEL, SHEFFIELD.

HUNTER'S

OXIDE OF IRON.

JAMES HUNTER, LESSEE, MINER, AND SHIPPER OF NATURAL IRISH BOG ORE.

This Estate yields the finest and most uniform quality in Ireland; and the quality is guaranteed.

Samples and Prices on application.

11, BAY STREET, PORT GLASGOW.

Telegrams: "HUNTER PORT GLASGOW."

ESTABLISHED 1872.

NEWBATTLE CANNEL.

Highest Results in Gas, & Excellent Coke.

QUOTATIONS ON APPLICATION TO

THE LOTHIAN COAL COMPANY,

LIMITED,

NEWBATTLE COLLIERIES,

DALKEITH, N.B.

THOMAS TURTON AND SONS, LIMITED,

SHEAF WORKS, SHEFFIELD,

MANUFACTURERS OF

FILES OF BEST QUALITY

FOR ENGINEERS.

STEEL OF ALL DESCRIPTIONS.

SCREW STOCKS, TAPS AND DIES, SPANNERS, RATCHET BRACES, LIFTING JACKS, ANVILS, VICES, AND ENGINEERS' TOOLS GENERALLY.

London Office:

90, CANNON STREET, E.C.

BOLDON GAS COALS.

Worked by THE HARTON COAL CO., LTD.,

Output about 3000 tons per day.

ANALYSIS—

Yield of Gas per ton	10,500	Cubic Feet.
Illuminating Power	16·9	Candles.
Coke	66·7	Coke.
Sulphur	0·86	Sulphur.
Ash	2·04	Ash.

Boldon Gas Coals are supplied under contract to

The Gaslight and Coke Company, South Metropolitan Gas Company, Commercial Gas Company, Imperial Continental Gas Association, European Gas Company, L'Union des Gaz (the Continental Union Gas Company), Ipswich Gaslight Company, Devonport Gas Company, Newcastle Gas Company, Sunderland Gas Company, South Shields Gas Company, and to many other Companies at Home and Abroad.

For prices, &c., apply to the

HARTON COAL COMPANY,

LIMITED,

Newcastle-on-Tyne.

W. H. PARKINSON, FITTER.

HOLMSIDE GAS COALS.

(Wrought out of Holmside and South Moor Collieries.)

PRESENT production over 3200 tons per working day. Area of coal about 5000 acres, including the largest remaining workable proportion of pure HUTTON SEAM GAS COAL. Analysis of HOLMSIDE GAS COAL *in bulk as shipped* gives 10,500 cubic feet of Gas per ton, of an Illuminating Power of 16¼ candles. The Sulphur is about 1 per cent., and the Ash 1¾ per cent. The Coal cokes well, and leaves about 70 per cent. of excellent Coke. To show the progress of HOLMSIDE COALS, it may be mentioned that the quantity carbonized by the London Gas Companies in 1885 was about 200,000 tons; whereas the present consumption of HOLMSIDE COALS in London alone is at the rate of over

400,000 Tons per Annum.

Full particulars on application to

MR. MARK ARCHER,

HOLMSIDE AND SOUTH MOOR OFFICES,

NEWCASTLE-ON-TYNE.

For **FIRE-BRICKS,** the most durable for **GAS-FURNACES,**

ADDRESS

JAMES WHITE & Co., Limited,

ALBERT WORKS, WIDNES.

Awarded HIGHEST MEDAL and DIPLOMA at the Newcastle-on-Tyne Royal Mining and Industrial Exhibition, 1887, for

CANNEL & COAL.

TYNE

BOGHEAD CANNEL.

Yield of Gas per ton	13,155 cub. ft.
Illuminating Power	38·22 candles.
Coke per ton	1,301·88 lbs.

EAST PONTOP GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	16·3 candles.
Coke	70 per cent.

SOUTH PELAW MAIN GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	16·3 candles.
Coke	73·1 per cent.

For Prices and complete Analysis, apply to

THOS. W. DANCE & SONS,

COAL OWNERS, NEWCASTLE-ON-TYNE,

OR

E. FOSTER & CO.,

21, JOHN STREET, ADELPHI, LONDON, W.C.

NEW **BOX'S** PATENT

RETORT LID-FASTENER.

CANNOT GET OUT OF ORDER.

DOES NOT DAMAGE LIDS.

SIMPLE & EFFECTIVE—CHEAP & DURABLE.

For Prices and Particulars, apply to

W. W. BOX, Gas-Works, Crayford, Kent.

[*Illustrated Description in* JOURNAL, *Vol. LX., p.* 346.]

THE SILICA FIRE-BRICK COMPANY,

OUGHTIBRIDGE, near SHEFFIELD,

MANUFACTURE

SILICA BLOCKS, BRICKS, AND CEMENT

OF SUPERIOR QUALITY

FOR GAS-FURNACES.

Trade Mark: "SILICA."

These Goods (largely used in Gas, Glass, Iron, and Steel Works) are, on account of their

GREATER DURABILITY

Strongly recommended where EXCESSIVE HEATS have to be maintained.

THORNLEY GAS COALS

WORKED BY THE

WEARDALE IRON AND COAL COMPANY, Ld.

OUT OF THEIR

THORNLEY AND WHEATLEY HILL COLLIERIES.

The Analysis made by Messrs. J. and H. T. PATTINSON, Public Analyst for Northumberland, gives 10,500 cubic feet of Gas per ton, with an Illuminating Power of 16·3 Candles and 67·3 per cent. of Coke. The following is a working Analysis made of these Coals by the Falmouth Gas Company:—

[COPY.]

FALMOUTH GAS COMPANY,

Offices: *Church Street, Falmouth, January 25th*, 1893.

Messrs. the

WEARDALE IRON & COAL COMPANY, LTD.,

NEWCASTLE-ON-TYNE.

GENTLEMEN,

From the Cargo of **THORNLEY GAS COAL,** received early this month from you, I have Carbonized at these Works, during a period of thirteen consecutive days, 151$\frac{15}{20}$ tons of the Coal, mixed with 9$\frac{6}{20}$ tons of Cannel Shale (or about 6 per cent.)

The Make of Gas during the above period was 1,624,000 cubic feet.

The whole of the Gas was made from four beds of sixes (24 mouthpieces); each charge being of six hours' duration.

Gas made: 1,624,000 cubic feet.

Coal Carbonized: 151$\frac{15}{20}$ tons.

Cannel Shale: 9$\frac{6}{20}$ tons.

Make per ton of Coal and Cannel Carbonized: 10,082 cubic feet.

Coke per ton (of good quality): 13$\frac{1}{4}$ cwt.

The ILLUMINATING POWER averages from 11 daily tests, **16·54 CANDLES,** which was ascertained by burning the Gas at the rate of 5 cubic feet per hour in a certified Letheby Photometer, fitted with a Standard Argand, each Candle consuming 120 grains of Sperm per hour.

Yours faithfully,

J. WM. BUCKLEY,

Engineer and Manager.

For Price, &c., apply to the

WEARDALE IRON & COAL Co., Ld.,

QUAYSIDE, NEWCASTLE-ON-TYNE.

JOHN BROWN & CO., LTD., SHEFFIELD,

Proprietors of

ALDWARKE MAIN CAR HOUSE & ROTHERHAM MAIN COLLIERIES, NEAR ROTHERHAM.

ALDWARKE MAIN GAS COAL

Analysis: 12,600 feet of 19-candle gas per ton.

Weight of illuminating power in pounds of sperm, 820·80. Very free from impurities.

Telegrams: "ATLAS SHEFFIELD."

Now Ready, Price One Guinea.

PRECEDENTS IN PRIVATE BILL LEGISLATION AFFECTING GAS & WATER UNDERTAKINGS.
1879-1890.

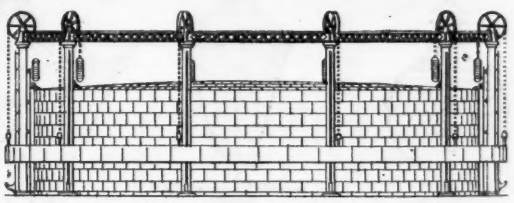
By E. H. STEVENSON and E. K. BURSTAL, M.M.Inst.C.E.
The Work published in 1879 by the late Mr. Stevenson is still on sale.

LONDON: WALTER KING, 11, BOLT COURT, FLEET ST., E.C.

HARPER & MOORES,
STOURBRIDGE.

MANUFACTURERS OF
BEST FIRE-BRICKS, GAS-RETORTS,
LUMPS, TILES, AND ALL ARTICLES IN FIRE-CLAY.
Proprietors of Best Glasshouse Pot, Crucible, and other Stourbridge Clays.
MANUFACTURERS OF GLASSHOUSE POTS AND CRUCIBLES OF EVERY KIND.
ESTABLISHED 1836.

HENRY BALFOUR & CO.,
LEVEN, FIFE.
MAKERS OF
GASHOLDERS

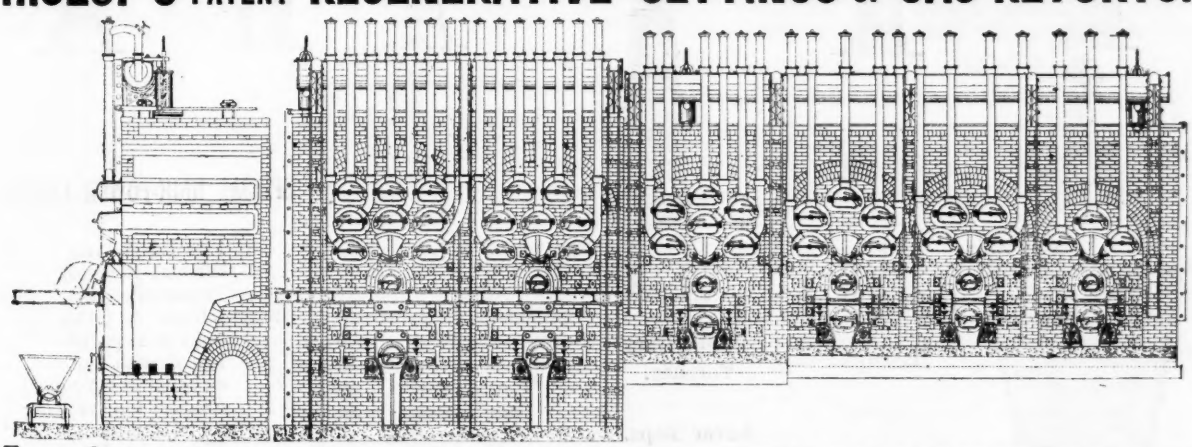


PRESSURE-REGULATORS FOR GASHOLDERS (See "JOURNAL" Dec. 20, 1892
FOUR-WAY VALVES,
AND ALL CLASSES OF GAS APPARATUS.

HENRY PUPLETT, 47, Victoria Street, S.W.

THE WIGAN COAL & IRON CO., LIMTD.,
Are exclusive Owners of the well-known HAIGH HALL & KIRKLESS HALL GAS COAL COLLIERIES, and supply the Best Wigan Arley Mine Gas Coal, Gas Nuts, Gas Cannel, Cannel Nuts, &c.
MIDLAND DISTRICT OFFICE: 22, TEMPLE ST., BIRMINGHAM—SOLE AGENT: A. C. SCRIVENER.
TELEGRAPHIC ADDRESS: "WIGAN BIRMINGHAM." TELEPHONE No. 200.
LONDON DISTRICT OFFICE: 6, STRAND, LONDON—C. PARKER & SON, SOLE AGENTS.
TELEGRAPHIC ADDRESS: "PARKER LONDON."

HISLOP'S PATENT REGENERATIVE SETTINGS OF GAS-RETORTS.



THESE SETTINGS ARE ADAPTED TO THE REQUIREMENTS OF ALL GAS COMPANIES AND GAS CORPORATIONS, AND HAVE ALREADY BEEN EXTENSIVELY ADOPTED. THEY ARE ERECTED UPON BOTH THE WORKING-STAGE AND SHALLOW-CHAMBER SYSTEMS, AND EQUALLY SATISFACTORY RESULTS ARE GUARANTEED IN BOTH CASES.

THE SETTINGS HAVE ATTAINED TO A MEASURE OF SUCCESS AND POPULARITY QUITE UNEQUALLED BY THAT OF ANY OTHER WITHIN THE SAME SPACE OF TIME. THE WORKING RESULTS OBTAINED, AND THE GENERAL SATISFACTION GIVEN, ARE DECLARED IN EVERY CASE TO EXCEED, AND IN MOST CASES CONSIDERABLY EXCEED, THE PATENTEE'S GUARANTEE. THE CONSTRUCTION AND WORKING OF THE PATENT PRODUCER AND THE PATENT CHARGING APPARATUS FOR SAME ARE ABSOLUTELY UNIQUE AND UNRIVALLED, AND ARE THE DELIGHT OF EVERY STOKER; WHILE IN EVERY OTHER PARTICULAR THEY SECURE THE HIGHEST RESULTS ATTAINABLE BY ANY REGENERATIVE SYSTEM, AND AT A MINIMUM OF COST.

Drawings and Specifications are furnished for the complete erection of Ovens, with or without Retort and Bench Mountings, or complete erection undertaken if required, and carried out by specially Trained Workmen.

Further particulars may be obtained on application to the Patentee's Agents: C. M. HAMILTON, 5, Stewart Street, Shawlands, Glasgow; J. E. FISHER, Stourbridge, and from R. F. HISLOP (son of Patentee), Gas-Works, Paisley.

HISLOP'S PATENT HYDRAULIC MAIN SEAL-REGULATING AND TAR-EXTRACTING VALVE is a *Sine quâ non* TO THE SATISFACTORY WORKING OF THE HYDRAULIC MAIN UNDER THE REGENERATIVE AS WELL AS OTHER SYSTEMS OF RETORTS. BEING LARGELY ADOPTED, AND AFFORDING THE HIGHEST SATISFACTION.

SPENT LIMES NO LONGER WASTE PRODUCTS
Under G. R. HISLOP'S PATENTS.

All Spent Limes are most effectually, economically, and continuously recovered at from one-third to one-half the cost of New Lime. The results are a surprise to all who have inspected the process, and are entirely satisfactory to all now using it.

Descriptive Pamphlets and Terms from Agents as above.

Gas Lamps and Posts.

Several thousands of these are now in use, giving general satisfaction. They are strongly made, and of best material.

Patent Street Lamps.

NO PUTTY.

Lamplighters' Torches.

Lever Taps.

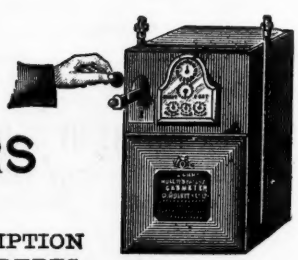
Lamp Governors.

PRICE LIST ON APPLICATION.

SPECIAL HIGH-POWER LAMPS.

For Lighting Streets, Refuges, Promenades, &c., where a good light is required. Fitted with Porcelain cone, Copper top and perforation, Wrought-Iron Spray, Lever Tap, Burner and Patent Governor, glazed with Opal top.

GAS-METERS.



PREPAYMENT METERS

(PRICE'S PATENT)

SPECIALLY ADAPTED FOR INCREASING CONSUMPTION AMONG SMALL CONSUMERS. NO RISK OF BAD DEBTS.

D. HULETT & Co., Ltd.,

55 & 56, HIGH HOLBORN, LONDON.

HEATHCOTE GAS COAL.

RICH IN ILLUMINATING POWER AND YIELD OF GAS.
ABOVE THE AVERAGE IN WEIGHT AND QUALITY OF COKE.
MAINTAINS A HIGH STANDARD IN RESIDUALS.

THE GRASSMOOR Co., Ld., CHESTERFIELD.

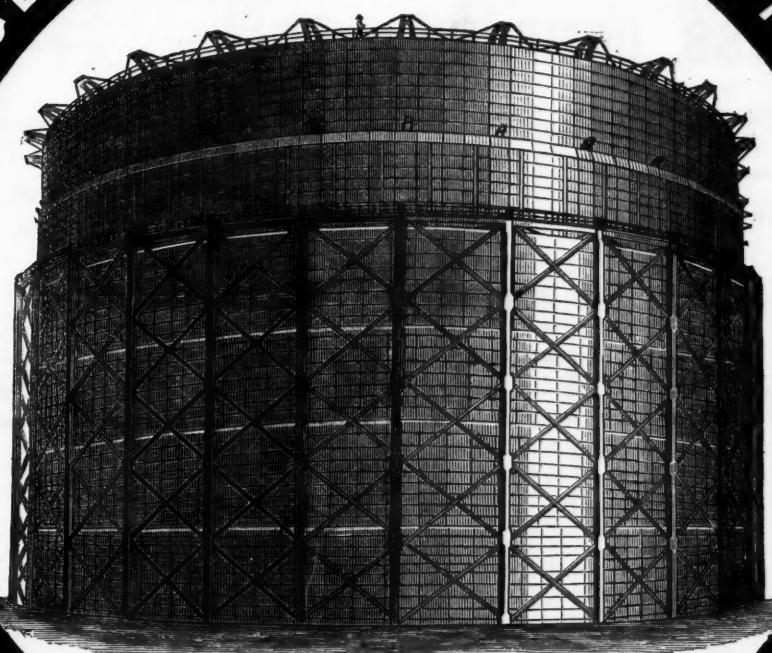
CLAYTON SON & Co, LTD

MAKERS OF

WORKS LEEDS

THE LARGEST GASHOLDER IN THE WORLD.

GASHOLDERS OUR SPECIALITY



CAPACITY 12 MILLION CUBIC FT.

ERECTED AT EAST GREENWICH FOR THE South Metropolitan Gas Company
IT HAS SIX LIFTS 30 FT DEEP EACH AND IS 300 FT DIAR

MAKERS OF GAS PLANT OF EVERY DESCRIPTION
ROOFS PURIFIERS &c. ALSO

ADDRESS LONDON 60, QUEEN VICTORIA ST.
TELEGRAPHIC "GAS, LEEDS."
GASHOLDERS OF ANY SIZE

ERECTED & COMPLETED WITHIN 12 MONTHS AND AT THE TIME SPECIFIED

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The United Gas Improvement Company, U.S.A.

A. G. GLASGOW, M.E..
Late General Inspector,
The United Gas Improvement Company, U.S.A.

HUMPHREYS & GLASGOW,

Contracting Engineers for Water Gas Plant,
9, Victoria Street, London, S.W.

WILLIAM INGHAM & SONS,

Incorporated with the Leeds Fire-Clay Company, Ltd.,
WORTLEY FIRE-CLAY WORKS
Near LEEDS,

Have confidence in drawing the special attention of GAS ENGINEERS to the following advantages of their Retorts:—
1. Smooth interior, preventing adhesion of Carbon.
2. They can be made in one piece up to 10 feet long.
3. Uniformity in thickness, ensuring equal Expansion and Contraction.

PATENT
MACHINE-MADE GAS-RETORTS.

GAS AND WATER PIPES
AND
CASTINGS OF EVERY DESCRIPTION.

MANUFACTURED BY THE
CLAY CROSS COMPANY,
CHESTERFIELD.

TRADE	TELEGRAMS:	LONDON AGENTS:
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MARK.	CLAY CROSS.	130, ST. SUFFOLK ST., S.E.

GODDARD, MASSEY, & WARNER'S
IMPROVED
Sulphate of Ammonia Apparatus.

The most successful and approved Apparatus known up to the present time.

FOR REFERENCES, PARTICULARS, TESTIMONIALS, AND PRICE APPLY TO

GODDARD, MASSEY, & WARNER,
ENGINEERS,
NOTTINGHAM.

The Apparatus has been supplied to the following Firms—
BURT BOULTON, & HAYWOOD, SILVERTOWN, and ELING.
CHANCE BROTHERS, OLDBURY (Four Apparatus).
RUNCORN SOAP & ALKALI CO., Limited, RUNCORN.
NETHAM CHEMICAL CO., Limited, BRISTOL.
ANIMAL CHARCOAL CO., Limited, SHADWELL.
WM. BUTLER & CO., BRISTOL.
KEMPSON & CO., Pye Bridge.

And to the following Gas Companies and Corporations—

ILKESTON.	BURY.	CHORLEY.
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HALIFAX.	MARKET HARBRO'.	CHESTER.
ALTRINCHAM.	PRESCOT.	SOUTH SHIELDS.
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DUKINFIELD.	DARWEN.	BOURNEMOUTH.
NORTHWICH.	NELSON.	SALFORD.
HUDDERSFIELD.	ORMSKIRK.	LUTON.
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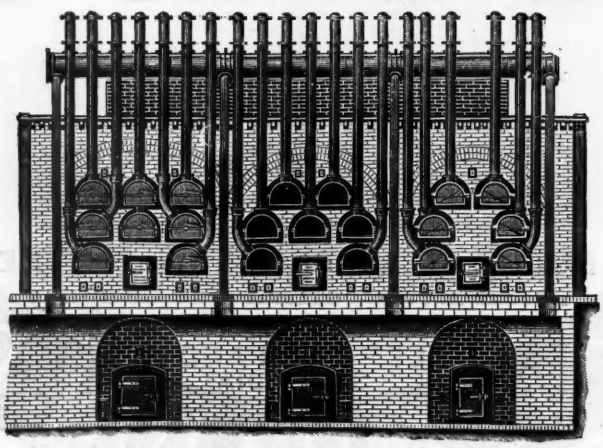
HALIFAX EXCHANGE.

GAS ENGINEERS,
CONTRACTORS,
IRONFOUNDERS,

BUILDERS AND ERECTORS OF EVERY DESCRIPTION OF OVENS, BENCHES, KILNS, FURNACES, &c.



RETORT SETTERS,
FURNACE BUILDERS
ETC., ETC.

REGENERATOR AND GENERATOR FURNACES ON DRAKE'S, FRITH'S, SIEMENS'S, KLONNE'S, HASSE'S, VALON'S, SOMERVILLE'S, PONSARD'S and other Principles.

INCLINED RETORTS

GASEOUS FIRING A SPECIALTY.

RETORT SETTING IN ALL ITS PRINCIPLES AND BRANCHES. BENCHES FITTED UP COMPLETE.
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OVENDEN, HALIFAX.

THE FLOW OF GASES AND PROPORTIONING GAS-MAINS—FOUR DIAGRAMS (with EXPLANATORY PAMPHLET), Invented by F. S. CRIPPS.

Price 7s. 6d., to be obtained at the JOURNAL Offices.

WILLEY & Co.,

Gas Engineering Works, Commercial Road, Exeter,

MANUFACTURERS OF EVERY DESCRIPTION OF

GAS APPARATUS.

GASHOLDERS, Telescope and Single Lift, any size. Some of the largest in the Kingdom, erected by this Firm, are giving the highest satisfaction.

PLANS and SPECIFICATIONS furnished for **Extensions** and **Enlargement** of existing **Works,** adapting them to the most **Improved** and **Modern Principle** of **Gas Manufacture.**

PURIFIERS, CONDENSERS, WASHERS, ENGINES and EXHAUSTERS, STATION METERS and GOVERNORS, manufactured and erected.

Makers, by permission of that eminent aulthority **MR. GEORGE LIVESEY,** of his **CELEBRATED PATENT WASHER,** highly approved by all the Engineers of Works where adopted. Largely in demand.

Special reference and attention are invited to our

WET AND DRY METERS,

which have acquired a high reputation for the **excellence** of Materials and Workmanship; their **durability** and **accuracy** of **Register** guaranteed. They are used by several of the **London Gas Companies,** and over **200 Provincial Gas Companies.**

Price Lists, Specifications, and Estimates provided for any work appertaining to Gas Lighting, from the Retort-House to the Drawing-Room.

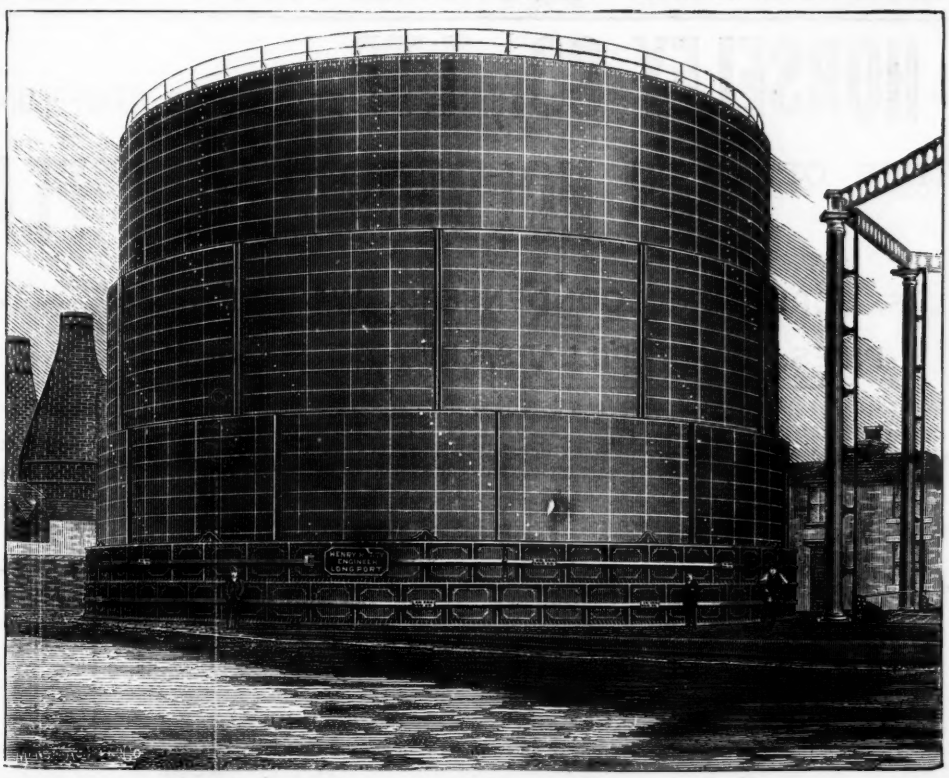
R. & J. DEMPSTER,

GAS PLANT WORKS, NEWTON HEATH, MANCHESTER.

MAKERS AND ERECTORS OF

PATENT COLUMNLESS GASHOLDERS.

Telegraphic Address: "SCRUBBER MANCHESTER."



Further Particulars and Estimates on Application.

Three-Lift Spiral-Guided Gasholder, working in a Cast-Iron Tank made with planed joints, erected at the Longport Gas-Works of the Burslem Corporation. Bottom Lift 90 ft. diameter and 20 ft. deep.

25 Gasholders upon this System have already been erected or ordered.

IMPORTANT TO ENGINEERS AND GAS COMPANIES.

A NEW CARBURETTOR FOR ENRICHING GAS IN BULK.

The Carburettors have been doing practical work for the past two years; in many cases doing all the enrichment without the use of Cannel or other rich Coals. The South Metropolitan Gas Company have these Enrichers at all their Stations. The Gaslight and Coke Company have had them in use at some of their principal Works for two years past; and several more are now being fixed at their other Stations. The Carburettors are also in use at several Suburban and Provincial Gas Companies' Works.

FOR PRICES AND FULL PARTICULARS, APPLY TO

THE GAS LIGHTING IMPROVEMENT COMPANY, LIMITED,

(FRANK W. CLARK, Engineer and Manager)

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RETORT WORK

HORIZONTAL, INCLINED, REGENERATIVE, GENERATIVE, OR FLOOR-LEVEL SETTINGS.

J. & H. ROBUS,

ENGINEERS AND CONTRACTORS,

MANSION HOUSE CHAMBERS, 20, BUCKLERSBURY, LONDON, E.C.

ARE PREPARED TO ENTER CONTRACTS

FOR EXTENSIONS OR RENEWALS OF THE ABOVE WORK DURING THE ENSUING SEASON.

PLANS, SPECIFICATIONS, AND ESTIMATES SUBMITTED

FOR EXTENSIONS AND RENEWALS OF EVERY DESCRIPTION.

Contractors for the Erection of Gas-Works complete, including Gasholder Tanks of all sizes and Main Laying.

THE HORSELEY CO., LTD., TIPTON, STAFFORDSHIRE.

MAKERS OF

GAS HOLDERS & GAS PLANT,

PURIFIERS, SCRUBBERS, CONDENSERS, WASHERS, TANKS, VALVES,

PIPES, LAMP PILLARS, RETORT-FITTINGS, ETC.

ALSO ALL KINDS OF

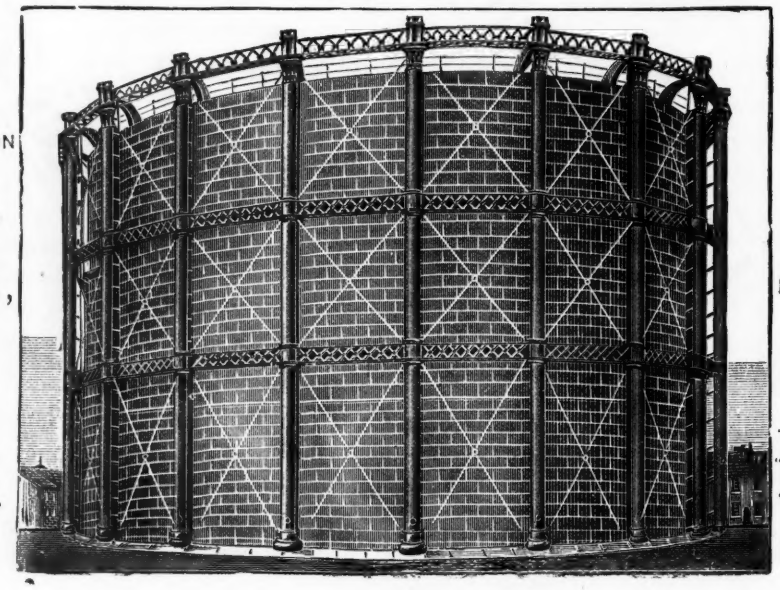
STRUCTURAL IRON

AND STEEL WORK,

BRIDGES,

ROOFS,

PIERS, ETC.



WORKS AND HEAD OFFICE:
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LONDON OFFICE:
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"GALILEO, LONDON."

HYDRATED OXIDE OF IRON
FOR GAS PURIFICATION.

Two to three times as rich in Hydrate as Bog Ore.
STRONG ACTION ON SULPHURETTED HYDROGEN.
We have for sale Hydrate of Iron containing 77 per cent. of Ferric Oxide and 17 per cent. of Water. Directions given for mixing for Purifiers.
LESS THAN HALF THE PRICE OF BOG ORE.

APPLY TO—
READ HOLLIDAY & SONS, LTD., HUDDERSFIELD.

SOOTHILL WOOD CANNEL.

Yield of Gas per ton, over 12,000 cubic feet.
Illuminating Power - - - 26 candles.
Coke per ton - - - - - - 57 per cent.
Of a quality almost equal to that made from the best Coking Coal.

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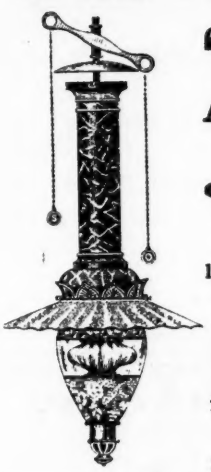

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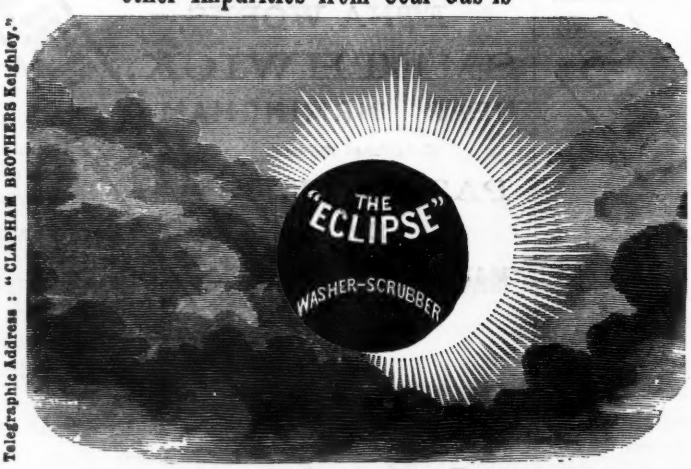

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The Patent Wooden Balls thoroughly break up the Gas; give an immense amount of freshly-wetted Surface; and do not clog or increase back pressure.

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